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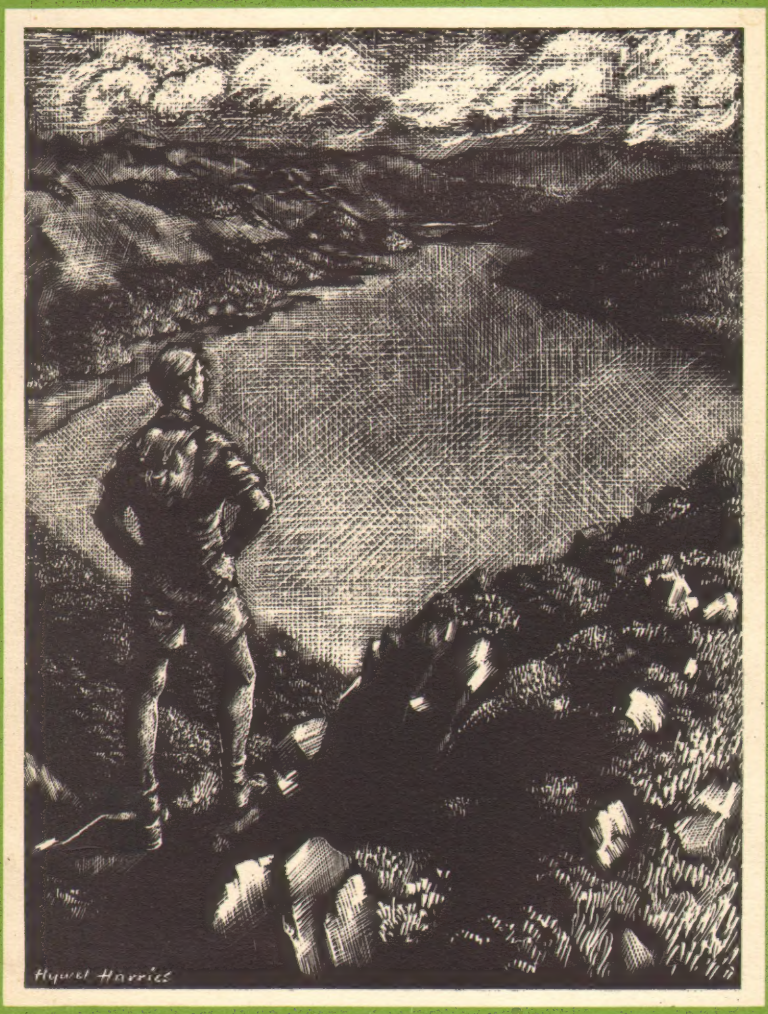

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FORESTRY COMMISSION GUIDE

CAMBRIAN FORESTS

Foreword by
LLOYD O. OWEN
Forestry Commissioner and Chairman of the National Forestry Committee for Wales

Edited by
H. L. EDLIN, B.Sc.
Forestry Commission

LONDON
HER MAJESTY'S STATIONERY OFFICE
1959

FOREWORD

As one who has for long been privileged to live in the heart of the Cambrian Forest region, and to take an active part in the development of its woodlands, it gives me great pleasure to welcome the readers of this guide book to its wonderful countryside. You must travel far and wide to see its equal: the cream of Welsh forests, the peaceful grandeur of Cader Idris and Plynlimon flanked by the estuaries and coastline of Cardigan Bay.

Despite its peaceful setting great changes are taking place in the rural scene. Every year new plantations are added to the landscape and now, aided by co-operative forestry societies, private woodland owners, many of whom are farmers, are joining in the effort to restore the woodlands, whose timbers Wales contributed to the Wars. The regimentation of the man-made forest is passing as nature blends the whole into one pattern. Alongside the plantations the brown hills are being made verdant green through re-seeding, which the sheep farmers are now able to accomplish with modern machinery.

Active also are those charged with the preservation of the countryside. The Nature Conservancy is preserving selected examples of surviving natural woodlands for scientific study, while that portion of the region which lies to the north of the River Dovey now comes within the Snowdonia National Park.

Those who have kindly contributed to the preparation of this Guide are specialists in their own subjects and have done much to discover and spread knowledge of the natural life and history of this part of Wales.

This book appears at a time of substantial development in Welsh forestry. Many of the older Commission plantations have reached the stage when industrial concerns can plan the utilisation of their timber for manufactured products such as building boards and paper pulp. Soon post-war plantations and those re-established by private owners will swell the flow of timber to the benefit of Welsh economy.

In welcoming visitors to this beautiful region of which we are so proud, may I add a note of warning—the careless visitor is a menace to farmer and forester alike. Livestock rearing is the main source of income to the farmers and therefore all gates should be left as one finds them—be it open or closed. Fire is the dread of the forester in dry weather and litter an eyesore to all and a danger to animals.

Will those who take pleasure in visiting the area help us to preserve and by example enhance this heritage we all share?

LLOYD O. OWEN

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The end-paper drawings are the work of Mr. Charles Howarth, of Conway.

Poetry. We are indebted to Messrs. Meiklejohn and Son, Ltd., for permission to quote the lines on page 52, by Will H. Ogilvie.

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Leonard and Marjorie Gayton for that facing page 8 (top), the four photos preceding page 9, and those facing pages 24 (t), 25, and 96 (t); Messrs. Photo Precision for the third photo following page 8, and that facing page 24 (b); Messrs. Eagle Photos for that facing page 40 (bottom); Mr. G. Kenneth Whitehead for that facing page 40 (top); Mr. A. R. Sansbury for that facing page 41 (t); Dr. J. K. St. Joseph and the Aerial Photography Department of Cambridge University for those facing pages 56 and 57; and Messrs. Powell Dyffryn for the two facing page 97.

The remaining six photographs were taken by members of the Forestry Commission's photographic staff.

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INTRODUCTION

BY THE EDITOR

Facing west towards the broad expanse of Cardigan Bay, the Cambrian Forests stand in a region where timber growing holds great promise as a source of future prosperity. From small beginnings in 1920, the Forestry Commission has expanded its work here as two factors became more and more evident. First, that these western hills, despite their steep slopes and soils often unrewarding even as pastures, were capable of growing useful timber crops at a rate unsurpassed elsewhere in Europe. Second, that by the careful choice of land for planting, forestry could be integrated with traditional agriculture in a way which left undisturbed both the country's magnificent scenery and the established ways of Welsh life.

This steady expansion has now reached the stage where every traveller down the valleys of the Cambrian region is bound to encounter the new plantations, and to see the timber lorries laden with their produce. The time has come to explain just what forestry—whether it be carried out by the Commission or by the numerous enthusiastic private landowners, can mean to this countryside. Hence this guide book, for which we have enlisted the help of people who know the region from several diverse angles—as teachers of science or history, as foresters or farmers engaged directly on raising the produce of its soils, or as artists and photographers.

Each of the Cambrian Forests has as its central feature one of the many lovely wooded vales, and indeed often bears the name of the river concerned. Deudraeth embraces the Vale of Ffestiniog, and

Coed y Brenin the lands of the Mawddach; Dovey lies beside the river of that name, while Taliesin is comprised of wooded slopes and wild uplands farther south. The Rheidol, Ystwyth, and Aeron Forests each lie within their green, westward trending, vales, while Hafren lies at the headwaters of the Severn, and Tarenig close to those of the Wye. The scattered woods have been grouped thus in order to secure easy access up the valley routes so important in Wales, often from some centrally-placed town such as Dolgellau, Machynlleth, or Llanidloes. So comprised, the forests fit into the local social pattern, having as a natural focus some market town which supplies their needs and often indeed many of their forest workers.

The rest of the forest labour force is drawn from two sources—the villages that were once supported by mining or quarrying industries, now discontinued or reduced in scale, and the scattered upland farmsteads. The small pastoral farm so frequent on these hills is often difficult to maintain as an economic unit, but the presence of a forest requiring labour, often at its very door, changes the whole picture. The Commission has, locally, encouraged this arrangement by providing its own smallholdings for its workers, who are usually local men.

There are two ways for the visitor to explore the Cambrian Forests and both have been allowed for in the chapter on approaches. One is to tour from one valley to the next, sampling in turn the variety of mountain and woodland scenery that each has to offer. The other is to select as a base one of the many pleasant inland towns or coastal resorts, and explore its surroundings; nearly every by-road now leads to a forest, and beyond that to a mountain. There are ample public roads and footpaths through and around most of the forests, while in addition the considerate visitor is welcome along any of the Commission's forest roads, provided he comes on foot; cars must perforce be excluded, as they might hinder timber hauling and even fire fighting.

The Commission's local staff, if called upon, will gladly give visitors assistance in seeing the more interesting plantations or forest work. Enquiries may be made at the nearest forest office—its address can always be found under 'Forestry Commission' in the local telephone directory.

Planting Spruce on Ploughed Ground

Cyfyd tewfrig goedwigoedd—a chuddiant
Lechweddau'r mynyddoedd.—Emrys

Here grow thick-branched forests that cover
The slopes of the mountains

FORESTS

BY W. A. CADMAN

The Cambrian Forests include within their boundaries many famous Welsh rivers and some of the principal mountains of Central Wales.

In the north the region is bounded by the Vale of Ffestiniog, which spills out into Tremadoc Bay, with the Morfa Harlech sand dunes lying to the south-west. Within the region are Trawsfynydd Lake, the Roman Steps, the two Rhinogs (Rhinog Fawr, 2,362 ft. and Rhinog Fach, 2,333 ft.), Rhobell Fawr (2,408 ft.), Aran Mawddwy (2,970 ft.) and Cader Idris (2,927 ft.). The Eden and the Mawddach rivers and, lower down, the Wnion, pour their waters into the beautiful Mawddach Estuary which lies between Dolgellau

and Barmouth. Further south is Tal y Llyn and the little Dysynni valley with its Craig yr Aderyn.

The very lovely river Dovey flows between gentle hills, winding through the centre of this Cambrian Forest area. Below Machynlleth it soon opens out into a wide expanse of estuary, bounded by the Ynyslas sand hills at the mouth, Borth Bog to the south, and the Aberdovey hills to the north. To the south-east is the Plynlimon Range of many hills of 2,000 ft. and over (the highest point on Plynlimon itself reaching 2,468 ft.). In the heart of this grand mountain are the sources of the Severn, Wye and Rheidol rivers. The Rheidol, flowing westwards, joins the Ystwyth at Aberystwyth harbour, where both enter the sea.

The remainder of the region comprises South Cardiganshire, being bounded by Tregaron Bog to the east, with Aberaeron and New Quay on the west.

Throughout this whole district of the Cambrian Forests there are ancient traditions of sheep farming and a long history of slate quarrying and of mining lead and other metals. But there are no traditional ancient forests which have survived to modern times; while in the past (with the exception of a few great estates) little interest has been taken in tree growing. Hence the proportion of forest land here, as elsewhere in Wales, was until recently lower than that in any other country in Europe, not even excluding Holland. Yet once the greater part of these hills was clothed with forest—oak, birch and mountain ash, much of it being scrub, because the soils are not conducive to the growth of first class hardwoods. (For the same reason there is very little land suitable for growing wheat). On the other hand the climate and soils are very well suited to the growth of conifers. Since Britain has very few native conifers, the forester has had to turn to other parts of the world for suitable species. Europe and Japan have provided some useful ones, but the most successful species in this part of Wales, have come from Western America. This is because there is there a wide choice of species accustomed to climatic conditions which have much in common with those of mid-Wales.

TREE SPECIES PLANTED

Let us look briefly at the most important conifers. It is natural to expect to find the Scots pine playing a fair part in these new conifer woods, for despite its name it is known to be native to mid-Wales, where its pollen is often found preserved in the peat bogs. But in practice it has proved a disappointing tree for the first planting of the bare hillsides; it suffers sadly from exposure, especially on the high ground or where it gets blasted by sea winds. Hence it is now

little used. From Europe comes the European larch which yields a valuable timber, but one which appears ill-suited to the exposed hill-slopes. It was used at Deudraeth, Coed y Brenin, Dovey and Ystwyth forests in the early years, but is now only planted on a very small scale. By contrast, the Norway spruce (known to us all as the 'Christmas Tree') grows on acid peaty soils, and has been widely planted with good results. Corsican pine, from the Mediterranean, is being used on the sand dunes at Harlech.

From Japan comes that important conifer the Japanese larch which has replaced the European larch in most afforestation work. Its early growth is very fast, and although it is not a very heavy volume producer, its early yield of poles, rails and pitwood ensures for it a place in all the forests within this region. In winter the bare branches provide a very lovely russet brown contrast to the various shades of green of the other conifers. Because of its fast growth it kills vegetation more rapidly than other species do, and thus provides a clean forest floor which is safe from fire risks.

From Western America the most important species are: Sitka spruce, Douglas fir, western hemlock, several silver firs, western red cedar and lodgepole pine. Sitka spruce is used more than any other species for three very good reasons. It withstands exposure well; it tolerates the low summer temperatures which are such a feature of the high ground in Wales, and it thrives on acid, peaty soils in high rain-fall areas. Further, it is a heavy timber volume producer, and its timber is in great demand. Much maligned, it is the 'black conifer' of the armchair critics, though in fact the colour of its foliage is a rather handsome blue-green. Its needles are uncomfortably prickly.

Douglas fir is only just within the range of its natural climate in mid-Wales. It will not do well at high elevations, but on reasonably warm and sheltered sites it grows to an enormous size and presents a magnificent picture. The western hemlock, *Tsuga heterophylla*, is another fine tree which thrives on the middle and lower slopes. The leading shoot and the ends of the branches always hang down in a dainty, fern-like manner, making it very attractive to the eye. The main silver firs are the grand fir, *Abies grandis*, and the noble fir *A. nobilis*. The latter is a particularly beautiful tree having a lovely blue sheen on its foliage. Its large cones, sometimes nine inches long, are quite a feature in the autumn. Western red cedar is notable for its long life and is already well proven, particularly at Dovey and Coed y Brenin. Lodgepole pine is remarkable for its ability to withstand the worst conditions of soil and, at high elevations, it takes the place of Scots pine on rocky sites.

The use of all these tree species varies with the local conditions,

but the broad pattern is Sitka spruce on the high ground, merging into lodgepole pine on rocky and poor soils, with the red-brown Japanese larch coming in on the middle slopes. The firs, all big volume producers, are grown on the lower slopes. In the valley bottoms and on the lower peat bogs Norway spruce is used. Corsican pine is planted on sand dune areas and, where there is direct exposure to sea winds, on light or rocky soils.

Many new roads are being constructed throughout these forests, at a density of approximately one mile per 80 acres. These new roads have opened up wonderful new scenery, and many people, meeting the forests from the inside for the first time, have expressed surprise at the beauty and wonder of it all, and compared the scenery to parts of Switzerland. There is no doubt that the amenities of the area have been greatly increased by the planting of these forests. In areas of special importance, careful attention has been paid to the amenity aspect and there are many plantations of beech, cherry, various oaks and maples, etc., which have been put in to enhance the local beauty. The contrasting colours of the different conifers, especially where Japanese larch has been used, give a very pleasing effect; in winter this tree brings the russet-brown ground colour of bracken to the forests.

Let us now review each of the forests in turn, starting in the north and proceeding southwards. The actual situation and extent of the forests are shown on the maps following pages 31 and 47.

DEUDRAETH FOREST, Merioneth (1,036 acres planted)

Named after the two *traethau*, or marshlands, on either side of Penrhyndeudraeth in the north of Merioneth, this forest comprises three quite different kinds of land. The oldest portion, formerly called Hafod Fawr, lies high in the hills, from 700 to 1,600 feet above sea level, a mile or so east of Ffestiniog village; it is plainly in view from both the road to Trawsfynydd and that to Bala. This group of plantations has much historical interest to foresters, for it was the first example in Britain of modern planting, by a Government agency, for timber production. The land was acquired by the Office of Woods and Forests in 1899, and planting began in 1900. The early experience gained, particularly in the choice of species, proved invaluable to the Forestry Commission when it began its big programme of afforestation in Wales in 1920. Many of the older woods are now sixty to seventy feet tall, and substantial quantities of timber are removed, each year, as thinnings; spruces and Japanese larch are the leading trees.

Since 1945, Deudraeth Forest has been extended by the addition of another type of country—eight blocks of cleared woodland,

rough bracken land, and scrub, lying on the hill slopes in and around the beautiful Vale of Ffestiniog between Blaenau Ffestiniog and Portmadoc. In the replanting of this ground, particular care has been taken to preserve the superb scenery; a variety of trees has been dispersed in small groups, so avoiding any suggestion of regimentation. The trees used include oak, beech, Chilean beech, wild cherry and wych elm among the hardwoods, and attractive conifers such as western hemlock, Japanese cedar, and the American silver firs.

The third class of ground at Deudraeth comprises sand dunes and flats of pure sand on the Morfa Harlech, a mile or two north-west of Harlech town. On such very dry and poor soils, only pines are likely to succeed, and Corsican pine is usually preferred; it is planted at the bottom of furrows ploughed in the sand, so as to get moisture and shelter. At one point the seashore dune has been 'fixed' by thatching with brushwood, to stop sand blowing inland. There is a small nursery where pines are raised from seed.

COED Y BRENIN, Merioneth (11,284 acres planted)

Coed y Brenin Forest, one of the largest in Wales, embraces all the woodlands around Dolgellau, in the valley of the Mawddach and its tributary streams. It lies within a ring of mountains that provide a magnificent scenic background,—in turn one sees Cader Idris, Aran Fawddwy, Rhobell Fawr, and the Rhinogs, while towards Barmouth and the sea flows the broad estuary of the Mawddach—sometimes a silver sheet of waters, sometimes golden with banks of sand. Though at first called Vaughan after a leading landowning family of the district, this forest was re-named Coed y Brenin—the Forest of the King—in 1935, in commemoration of the Silver Jubilee of King George V.

Some of the oldest and most conspicuous plantations of Coed y Brenin lie beside the main road from Dolgellau to Trawsfynydd, particularly in the neighbourhood of the Ty'n y Groes Hotel and Ganllwyd village. The first planting was done in 1922; Douglas fir is a leading tree, but there are also stands of Japanese larch, Norway and Sitka spruces, and Corsican pine; these have grown well and thinnings have been in progress for several years. A network of new forest roads, with many bridges, has been driven up the valleys, and these now carry a constant stream of timber cut when the woods are thinned out. Higher up the valleys the country becomes wilder and more exposed, and the outlying farmsteads are sheltered by plantations of the hardy Sitka spruce, lodgepole pine, and Japanese larch.

These three trees also play a leading part on the higher slopes of the Wnion valley, where plantations neighbour the main road and

railway from Dolgellau to Bala for over eight miles. But on the foothills of the Wnion, and down the Mawddach estuary from Dolgellau towards Barmouth and Arthog, most of the new planting is being done on kindlier land that once carried oak scrub. Here therefore a wider range of trees is planted, with an eye to satisfying scenic effects. Beech, oak, wild cherry, and lime have their place beside the larches, pines, spruces, hemlock, and silver fir. Outlying portions of this extensive forest lie high up the slopes of Cader Idris on the south, and up the rugged and remote valley of Cwm Mynach on the northern side of the Mawddach estuary. The forester's office is at Glasdir, a mile south-west of Llanfachreth, and farther down the same by-road there is a small arboretum, or collection of rare trees.

Within Coed y Brenin there are several old gold mines, some copper mines, and many old lead workings. The streams provide a succession of fine waterfalls, the best known being Pistyll Cain and Rhaidr Mawddach, where the rivers Cain and Mawddach meet, beside an abandoned gold mine. With its rich variety of scenery, from the sea shore to the rugged peaks, and with farmlands and hill grazings interspersed among its plantations, Coed y Brenin is a particularly lovely forest. Spring, when its larches and birches burst into leaf, and autumn when the purple heather blooms, are its most attractive seasons.

DOVEY FOREST, Merioneth and Montgomery
(14,000 acres planted)

All those Commission woods that lie around Machynlleth within the basin of the River Dovey, north of the Cardigan border, or in the neighbouring vales of the Dyffryn and Dysynni rivers close to Towyn, comprise the young Dovey Forest. In all, it has thirty blocks, large and small, scattered over the hills, and some of the woods run as high as 2,000 feet. In round figures, there are 19,000 acres (or some thirty square miles) of land in this forest; 14,000 already carry plantations, 2,000 will shortly be planted up, and the balance of 3,000 consists partly of farms and smallholdings, but largely of mountain tops too high for timber growing. Planting began here in 1926, and has proceeded steadily for over thirty years. The main trees used are Norway and Sitka spruces, Douglas fir, and Japanese larch, but some lodgepole pine, silver firs, Western red cedar, Lawson cypress, and other forest trees have been planted on a lesser scale. A stand of the Western hemlock, *Tsuga heterophylla*, is reputed the best in Europe, while there are notable plots of the Chilean beech, *Nothofagus procera.*

Growth of trees under the mild climate and ample rainfall found here is rapid, and woods are often ready for thinning after fifteen

The Mawddach at Ty 'n y Groes, between the Douglas firs of Coed y Brenin and the oaks of Dolmelynllyn

Where the Afon Wen joins the Mawddach: sparkling falls, green Douglas firs, and rugged oaks, in Coed y Brenin

Looking down the upper gorge of the Mawddach, from the slopes above Rhaidr Mawddach, Coed y Brenin

The western ramparts of Coed y Brenin: Y Llethr, Rhinog Fach and Rhinog Fawr

The old stone town of Dolgellau beside the River Wnion, looking towards Gau Graig and outlying woods of Coed y Brenin

The course of the Mawddach through the Ganllwyd Valley in the heart of Coed y Brenin, as seen from the Precipice Walk

Bryn Brith and its woodlands, with the Mawddach estuary beyond, south-west of Dolgellau

years' growth. Each year the foresters have to thin out some 1,500 acres, and a fine system of forest roads has been built deep into the woods, to enable lorries to collect the small poles that result, and so to speed them to distant consumers. The horse is still preferred for the first stage of the journey—from stump to roadside. Each year nearly half a million cubic feet of timber is sold, all in the form of thinnings, bringing in a cash return that has amply justified the formation of this vast forest. At the present time nearly half the produce is going to a paper mill at Ellesmere Port in Cheshire, and a similar quantity to chipboard and wood wool factories at Newtown and Queensferry; the balance is taken up locally by small sawmills and also by farmers for fencing and similar uses.

Dovey Forest provides steady employment for around 220 workmen, besides a score of supervisors. Most of the men were recruited locally when the output of the big slate quarries hereabouts declined; forestry has thus maintained prosperity in valleys that would otherwise have been faced with unemployment. Since the villages were there already, there has been little need to build fresh houses; but at Esgairgeiliog a former labour camp has been converted into 22 modern dwellings; 4 timber houses have been built and several smallholdings established. For those who like statistics the following figures give some background knowledge to explain this big capital investment in growing trees. An average acre of young plantation at Dovey increases in volume by 165 hoppus feet (or a weight of $5\frac{1}{2}$ tons of green timber) each year; the total increment at present is around one million hoppus feet (or some 33,000 tons) each year; this is worth as it stands in the woods, at least £125,000; put another way, this forest increases in value by about £350 *every day*.

Among the less well-known features of interest around these woods are three places in the Dysynni valley—Castell Bere, an Edwardian Castle; Craig yr Aderyn, or the Rock of the Birds, one of the few places in the world where cormorants nest inland; and Peniarth House, where several notable old Welsh manuscripts were preserved. Close to Pennal the Romans had a fort on the Dovey, called Maglona, from which Machynlleth derives its name. It could be provisioned by sea, and indeed the sailing ships that used to export the district's slates, timber, and oak bark used to come upstream thus far on the tide, to anchor at pools called Derwen Las—'the green oakwood'—and Llyn y Butry. But today the Dovey is better known for salmon, trout, and sailing, than for its commerce. At Aberdovey there is an Outward Bound school for young men and boys, parties of whom make regular excurions on foot over the hills of Dovey Forest, where they take part in tree felling as part of their training.

TALIESIN FOREST, Cardiganshire (2,000 acres planted)

This new forest lies to the east of Talybont, midway between Aberystwyth and Machynlleth. It takes its name from the hamlet of Tre Taliesin, which in turn is called after the ancient Welsh poet, who is reputed to have been washed ashore, when a child, on the Dovey estuary nearby. Those woods that are most in the public eye stand along the foothills to the east of the main road, between Talybont and Ysgubor y Coed. These are old worn-out oak coppices, which are now being replanted, largely with larch. There are two beautiful approach routes that run beside them. One is the famous Artists' Valley, running inland from a point half a mile south of Ysgubor y Coed. The other is the Llyfnant Valley, running in from a point one mile north of Glan Dyfi station, towards the remote falls of Cwm Rhaidr and Pistyll y Llyn. Much of the woodland beside the latter route is under private ownership, and provides a good example of the enterprise of the district's landowners.

Another aspect of Taliesin Forest is found on the high grassy moors around Bwlch y Garreg and the Angler's Retreat, where half-a-dozen small rivers begin their courses down to the Dovey, the Leri, or the Rheidol. Here some of the old Pryse sheep walks are being afforested with Norway and Sitka spruces, on a large scale. The total extent of Taliesin Forest is 6,700 acres; of this some 2,000 acres have now been afforested, 3,000 await planting, and 1,700 are to remain under farming use.

RHEIDOL FOREST, Cardiganshire (2,600 acres planted)

This forest embraces 4,000 acres in a dozen portions, on the hills to the north and east of Aberystwyth. The older portions, including those once called Brynmawr, are encountered along the main road to Llanidloes, a mile or so beyond Goginan. They extend well to the north, touching on the ponds of Blaen Melyndwr and Pendam, and running up towards the head waters of the River Rheidol—now the scene of a big hydro-electric scheme. Spruces are the main trees grown in this portion of the uplands, around Ponterwyd.

Another aspect of Rheidol Forest is seen along the gorge of the River Rheidol between the Devil's Bridge and Aberystwyth, where five long and narrow blocks of old oak coppice woodlands have been acquired for replanting. Here Douglas fir and Japanese larch will be among the main trees used. These woods slope steeply down towards the river; and preserve the sylvan views along the famous little narrow-gauge railway to the Devil's Bridge. Close by the Nature Conservancy is maintaining a portion of the oakwoods in their existing condition, to provide a reserve for studying wild life.

Yet another aspect of Rheidol Forest is found on the hills to the

north of Aberystwyth, around Bow Street. There the old woodlands of the Gogerddan estate have been replanted, largely with Japanese larch, Douglas fir, and other conifers, but including also some hardwoods such as beech. This will help to preserve the woodland scenery close to the town.

A large arboretum has recently been planted at Gogerddan. This is handy to Aberystwyth, and will become of great scientific interest in the future.

HAFREN FOREST, Montgomery (8,000 acres planted)

This forest draws its name from the River Severn, or Afon Hafren, which actually rises within its bounds. It is a fairly young forest, having been started as recently as 1937, but growth has been so good that its older plantations of Sitka spruce and Japanese larch are already being thinned, to provide pitwood and small sawmill timber. Its main portion lies north-west of Llanidloes, between that town and Plynlimon, occupying a series of valleys on the head-waters of the Severn and its tributary, the Clywedog. From north to south these valleys are: first the Clywedog, then its two tributaries the Llwyd and the Biga; next the Afon Hafren or main Severn stream, then its two tributaries the Afon Hore and the Bidno. Other substantial blocks of woodland lie on the hills around Van and Staylittle, while recently a number of smaller woods have been added closer to Llanidloes, the most conspicuous being the Berth Llwyd woodland on the steep slopes just east of the town, close to the main road and railway. Altogether Hafren holds 11,000 acres, and 8,000 have now been planted up; about 500 more remain to be planted, while 2,500 consist of mountain grazings.

The chief species planted here are the Norway and Sitka spruces, but there are also substantial areas of Japanese larch and lodgepole pine, some Douglas fir, and a little western hemlock. European larch, oak, and beech. The plantations are remarkable for their uniform vigour of growth. A good road system has been built, and in order to house some of the sixty workers employed, two groups of houses have been built. One is at Tyn yr Wtra, on the Severn, the other at Llwyn y Gog, beside the Clywedog near Staylittle.

TARENIG FOREST, Montgomery and Cardiganshire
(1,857 acres planted)

This is the forest that is seen by thousands of travellers coming by road to Aberystwyth, since it borders the main road from the English Midlands, via Llangurig and Ponterwyd, for a distance of six miles. One portion lies on the western side of the Eisteddfa Gurig pass, forming a great horseshoe of plantations on the hillside, in the steep

valley of that little river, the Afon Castell. The rest grows on the eastern side, along the vale of the Afon Tarenig, which runs down to join the infant Wye at Pont Rhydgaled. A big extension (out of sight from the high road) is under way to the south of this, where a new forest road winds over the hills to the lonely moorlands around Nant Rhys, on the headwaters of the River Ystwyth.

To the ordinary observer, Tarenig presents a grand panorama of spruce, pine and larch, sweeping up the hillsides; over most of the ground progress, though uneven, has proved satisfactory. But by the foresters' standards certain portions of it are regarded as problem areas, calling for special investigation. This forest in fact is situated on a very poor type of clay soil, compacted by generations of overgrazing. The difficulties which this type of ground present were not fully realised in the early years (the first planting was in 1929) and some of the early plantations have been very slow to get away. It is the experience gained at this forest, which has led to the development of new techniques, such as the application of phosphatic fertilisers. These in turn have resulted not only in very much better results in post-war plantations on similar ground, but also in making it possible to plant even worse land.

A large part of the forest has reached the thinning stage and a considerable mileage of new roads has been constructed in order to extract the produce.

MYHERIN FOREST, Cardiganshire (3,212 acres planted)

Myherin Forest is situated on the high ground east of Devil's Bridge. The greater part of the forest is over 1,000 feet and therefore it is chiefly a spruce forest, although there are also blocks of pine and Japanese larch.

The plantations are on both banks of the Nant Rhuddnant and of the Afon Myherin, which gives its name to the forest. Several new roads have been constructed and fine views of the forest and surrounding country can be obtained from the forest road which starts at The Arch and ends just under Banc Myherin (2,005 ft.).

This forest has historical associations with the past, since Thomas Johnes of Hafod had afforested many of the drier banks between 1780 and 1815. Most of his plantations were felled in the 1914–18 war, and unfortunately a complete clearance was made. The Pwll Peiran block, where Stapledon carried out much of his grass-breeding experimental work, has been acquired for joint development by the Forestry Commission and the Ministry of Agriculture as a demonstration area, to show how forestry and sheep farming can be mutually integrated with fullest use of the soil. It will be a long-term project but it is expected that ultimately the shelter

benefits from the timber plantations will enable the sheep-carrying capacity of the open hill to be substantially increased.

YSTWYTH FOREST,
Cardiganshire and Montgomery (4,015 acres planted)

The oldest parts of this forest, where planting commenced in 1930, were formerly part of Lord Lisburne's Crosswood estate and lie on the Ystwyth between Trawscoed and Ysbyty Ystwyth. The Ystwyth valley below Pontrhydygroes is very beautiful; the river runs through deep gorges, which are much enhanced by the plantations of cherry, oak, beech, red oak, Japanese larch and conifers which have been designed to give pleasure to travellers using the main road, as well as to produce good timber.

Further down the valley, around the village of Llanilar, are several scattered banks of woodland which have been added to the forest in recent years. These have now been replanted.

East of Pontrhydygroes another important post-war addition is the Hafod Estate. This Estate is famous in the history* of Rural Wales, for it was here, on the very fringe of the high moors, that Thomas Johnes lived and carried out his great experiments for the improvement of agriculture and for afforestation, on a scale which was both bolder and more successful than any such undertaking elsewhere in Wales.

Unfortunately the Estate had been completely exploited for its timber before it was acquired by the Forestry Commission, and scarcely a tree remained. Even the mansion was a ruin and in 1958 it was demolished in the interests of safety. The area has been replanted with great care and in due course very fine timber will grow here once again. The garden, which was made for Johnes' daughter, Mariamne, has been carefully preserved in its present state of shrubs and ornamentals. His wife's garden, which was completely derelict, has been replanted with wild cherries. Behind the ruins of the mansion is a large area of wild azalea, which is fragrantly beautiful in spring. The nearby Hafod Church, which holds memorials of the Johnes family, well merits a visit.

AERON FOREST, Cardiganshire (857 acres)

Aeron Forest draws its name from the Afon Aeron, which follows a great curve through the hills of South Cardigan to enter the sea at Aberaeron. Here along the broad sweep of Cardigan Bay, between Aberystwyth and Cardigan town, most of the land is divided into small pastoral farms that provide a pleasing contrast with the wild

* *Peacocks in Paradise* by Elizabeth Inglis-Jones (Faber, 1950) gives much of the history of this period.

mountains to the north and west. At first sight there would seem to be little room or need for forestry here; but in fact the whole countryside suffers from severe exposure to the gales from the Irish Sea, while many farms include land that has proved, despite much effort in the past, to be too poor for agriculture. Aeron Forest has therefore been conceived, not as a great continuous block of woodland, but rather as a plan for integrating tree planting with agriculture; at present it comprises no less than forty separate blocks, acquired from an even greater number of individual owners. There are three main types of ground: hard stony and heather-clad hilltops, where plantation largely of pine and spruce will shelter surrounding fields; ill-drained and very acid *rhos* or bogs, which after ploughing will support good shelterwoods of Sitka spruce; and steep slopes of vales and dingles, where the soil is good and a wide variety of trees—including broadleaved ones—can be grown. As Aeron is a young forest, begun as recently as 1954, these woods are only gradually becoming obvious; but already several can be seen along the high road from Lampeter through the beautiful Vale of Aeron, and in dingles near the sea around the charming old fishing village of New Quay.

THE HUMAN FACTOR

In the Welsh hill country, where sheep farming is the traditional occupation, there has been a steady decline in the rural population. There are few young people to replace the aging population in the remote areas, and many farmsteads are becoming empty and falling into ruin.

Forestry, one of the oldest and greatest industries in the world, though only newly revived in Wales, has already done much to arrest this drift from the countryside. The labour employed is from seven to ten times more, acre for acre, than is employed under sheep farming. Many new houses have been built for forest workers and many more will be required. It is the present policy to enlarge existing villages in order to house the extra labour required for forestry.

In mid-Wales the good land and the poorer land are closely intermixed. The integration of agriculture and forestry, wherein the good land is retained in agriculture and the poorer land converted to forest, has already made considerable progress.

The impact of forestry upon Wales spreads far beyond the soil and those who find their livelihood within the forest. As the forests grow, new roads are built and new areas become available to the countryside. Tourism is one of the important industries of rural

Wales, greatly encouraged by the beauty of the new forests. But the most important factor is the great wealth which is already beginning to come out of the forests in the form of timber.

Production starts with the first thinnings, which are removed, in the case of Japanese larch, as early as the eleventh year and in Sitka spruce by about the twentieth year. The thinnings have many rural uses—rails, fence posts, stakes, barn poles, gates and so forth for farm use. But the major items of use are for pitwood, pulpwood and planking timbers, and also for the new forms of man-made timber—hardboard and softboard—which are made by breaking down the logs into fibres and then building them up again. Another interesting product is wood wool, obtained by shredding logs and used as a packing or filling material.

The Cambrian Forests are becoming a major producing area. The principal consuming areas are the South Wales and Midlands coalfields, the new Welsh mills at Llandovery, Newtown and Queensferry, and the great paper pulp factory at Ellesmere Port.

A well managed forest lives for ever, since the amount of timber felled in thinnings and final crops is not allowed to exceed the rate of growth. It has been calculated that the rate of increase of the value of all the Cambrian Forests is already in the region of £440,000 per annum.

Yma'n eu hedd y mae hen neuaddau,
Rhai'n gaead lonydd, a'r hen goedlannau.

Parry Williams

Here wrapped in peace stand the old mansions,
Some closed and silent, and the old woodlands.

THE OLD MANSIONS AND THEIR WOODLANDS

BY DAVID JENKINS

One of the earliest known records of interest to Welsh foresters is to be found in the *Chronicle of Abingdon Monastery*, where reference is made to the absence for seven weeks, early in the twelfth century, of some of the monks who had journeyed into Wales with a number of waggons, each drawn by twelve sturdy oxen, to procure timber for repairing their church. Whither the brethren went we are not precisely told, but there is a good deal of evidence that inland forests as well as those of the border country were early noted for their hardwood.

History, and for that matter the medieval romance tales too, tell how the forests provided King and nobleman alike with revenue and pleasure during peacetime; and in time of war supplied the enemy with ample cover for his guerrilla tactics. An example of the latter is reflected in the terms of the licence granted by King Edward I, on 30 March, 1300, to the abbot and convent of Strata Florida to rebuild on its former site, their abbey which was burned during the war, on the condition 'that the woods and ways around it which may become a source of danger in the future be cut down and repaired by ordinance of the Justice of West Wales'.

Some three hundred years later the demands of a ravaging industrial policy cleared even the most thickly wooded valley in north Cardiganshire, and left unsightly spoil heaps to remind us of the thriving communities of lead and silver miners which once lived here.

HAFOD

By the end of the eighteenth century the need for planned afforestation became very real, and it fell to the principal landowners to provide the necessary impetus. Among these by far the most knowledgeable and energetic was Thomas Johnes, the new squire of Hafod near Ysbyty Ystwyth, agriculturalist, literateur, and politician.

After a life of easeful living, in 1783 Johnes came to Hafod which he had inherited along with other property from his father. The bleak desolation which surrounded the place appears to have had a challenging effect on its new owner, for he set about a programme of reconstruction with such zeal and vision that within a few years Hafod became a byword for elegance and beauty.

Hafod rebuilt reflected the mood and ideas of the most enlightened and affluent landowners of the eighteenth century. The old house was pulled down and a new mansion in rich Gothic style 'with pointed windows and pinnacles' was erected to a plan by Thomas Baldwin of Bath. In 1793 he added an octagonal library to which light was admitted from the dome, with a conservatory 160 feet long adjoining it.

The library contained a fine collection of Welsh and French manuscripts, including *Froissart's Chronicles*, and a valuable selection of printed books. The *Chronicles* Johnes himself translated, and had printed partly at his own private press at Hafod.

When fire destroyed much of the house and most of its literary and artistic treasures in 1807, the pecuniary loss was estimated at £70,000, independent of the £30,000 which was covered by insurance.

Johnes' chief interests, however, lay in agriculture and afforestation, and 'The Society for the Encouragement of Agriculture and Manufactures in the County of Cardigan' found in him a generous patron and an active member for thirty or more years.

The extent to which, within a few years, he transformed the wild tree-less uplands which formed his estate, into a well ordered plantation, may best be appreciated by the fact that on five occasions he was awarded the medal of The Royal Society of Arts 'for sowing, planting and enclosing timber-trees'.

Writing from Hafod on 25 September 1801, Johnes claimed:

Hafod

'My plantations are generally made on such land as I cannot plough . . . I plant the sides of the mountains which are almost universally composed of argillaceous shistus or slate rock; the surface of which is decomposed by exposure to the atmosphere and admits the roots of trees to penetrate therein, and to grow luxuriantly'.

From October 1795 to April 1801 he is reputed to have planted 2,640,000 trees (of which 1,200,000 were larches) on from 1,200 to 1,400 acres. Practically all the timber Johnes planted was cleared during the two world wars, but the Forestry Commission is now engaged on replanting the land, as part of its Ystwyth Forest.

TRAWSCOED

Following the river Ystwyth some twelve miles downstream from Hafod, through scenes of exquisite beauty, we come to Trawscoed—previously also known by its English equivalent of Crosswood. From early in the thirteenth century until 1947 it was the family seat of the Earl of Lisburne. The north wing, which may have formed the nucleus of an older building, was rebuilt during 1891, when four old beams bearing Biblical inscriptions were discovered under the kitchen plaster. These, it was assumed, were taken from the Cistercian Abbey of Strata Florida at its dissolution, so that the oldest part of Trawscoed probably dated from the sixteenth century.

The Vaughans of Trawscoed played a leading part in Cardiganshire life for many centuries, and Sir John Vaughan became Chief Justice of the Courts of Common Pleas in 1668. An able parlia-

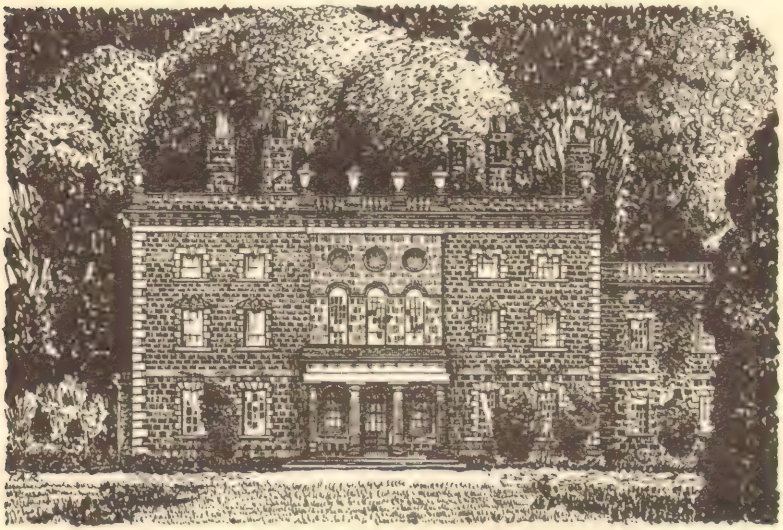
mentarian, he represented both the boroughs and county of Cardigan. A member of the 'Country Party', he counted among his personal friends John Selden, Thomas Hobbes and Sir Matthew Hale.

Apart from the extensive tree-planting undertaken around the mansion, from 1711 onwards we find a clause inserted in the leases of farms on the Crosswood estate prohibiting the cutting down of timber by the tenants.

During the nineteenth century Cardiganshire landowners realised that the need for improving their estate farms could only be met by extensive capital expenditure. Among the *Crosswood Estate Papers*, deposited in the National Library of Wales, at Aberystwyth, it is interesting to note with what meticulous care the accounts for the woodlands were kept, so notable a contribution did they make towards a balanced estate economy.

NANTEOS

A little off the road leading from Trawscoed to Aberystwyth stands Nanteos ('Nightingale's dell'), described by one enraptured writer as 'embosomed in a warm depression where several rivulets meet—a place made by nature for a home of elegance'. Here belongs the famous healing cup which one tradition insists was the chalice used at the Last Supper. At the dissolution of Strata Florida Abbey it



Nanteos

was brought here for safe custody, and over the centuries there have always been witnesses eager to bear testimony to its powers of healing.

PLAS GOGERDDAN

A few miles north of Aberystwyth, on the road leading through the village of Penrhyncoch to Rheidol Forest, is Plas Gogerddan, until 1948 the family seat of the Pryses, perhaps the most famous of all Cardiganshire families, and one which traces its local history at least as far back as the thirteenth century.

Plas Gogerddan was originally built during the latter half of the fifteenth century, but most of the present building is of recent date. During reconstruction work on the house in 1948, workmen uncovered over one of the fireplaces a massive oak beam dating from the early sixteenth century. An interesting item of furniture presented by Sir Pryse Saunders-Pryse, Bart., to St. Fagans Welsh Folk Museum near Cardiff is a long table which from time immemorial had stood in the hall. A similar table, which I believe is still at Rûg, near Bala, was made from the same Gogerddan-grown tree.

One of the most notable members of the family, Sir Carberry Pryse, in 1691 fought two keenly-contested but successful legal actions against the Crown over his right to work a newly discovered vein of lead and silver on his land at Esgair Hir about Talybont, later called the Welsh Potozi Mine. A third action was only thwarted when Sir Carberry, upon petition, obtained a writ of *nolle prosequi*. As a direct result of this verdict Parliament passed an Act whereby landowners could henceforth freely work any minerals on their lands without reference to the Crown. While the costs of these trials almost financially crippled the Gogerddan family, the way was now open for unhampered private enterprise, and this may have hastened the coming Industrial Revolution by a century or more.

Owing to the family's early associations with the Royal and Horticultural Societies of England, and the fact that they also held substantial estates in Berkshire and Oxford, the Pryses were generally in the forefront of agricultural reforms. Extensive tree-planting was carried out on the Gogerddan estate about 1807 by Pryse Pryse who employed a woodman at a yearly salary of £50. A visitor to the estate some time later commented on the vast improvements made in recent years and ventured the opinion that 'the oak are among the finest in the county—fit for prime navy pieces'. The mining industry with its smelting works at Furnace near Eglwys Fach on the Machynlleth road had cleared the country between the rivers Rheidol and Dovey of all trees during the seventeenth and eighteenth centuries, so that only a very determined effort on the

part of landowners could amend the folly of unbridled exploitation.

Space will not permit a detailed evaluation of the contribution in this respect made by the Cardiganshire Agricultural Society, which offered substantial premiums annually to members or their tenants who planted the greatest number of forest trees. This encouragement resulted in many new extensive plantations, and the demand was such that at least six nurserymen were doing brisk business in different parts of the county at the opening of the last century.

PENIARTH

Crossing the river Dovey into Merioneth we soon come upon a number of mansions which have played vital parts on the history of Wales. In the parish of Llanegryn, and on the north bank of the Dysynni, stands Peniarth. The present mansion was built partly in 1700 and partly in 1812, when a more ancient building was pulled down. To the literary historian, Peniarth will always be linked with Hengwrt, situated half-way between Dolgellau and the ruins of Cymer Abbey, home of Robert Vaughan (1592-1666) historian and antiquary, friend of John Seldon and Archbishop Usher.

It is no exaggeration to state that Vaughan ranks among the foremost benefactors of Welsh scholarship. If it were not for his cultured tastes we might well have lost such priceless manuscripts as *The Black Book of Carmarthen*, *The Book of Taliesin*, *The White Book of Roderick*, *The Black Book of Chirk* and many others not so valuable which, dating from the middle of the twelfth century, contain the earliest collections of Welsh poetry and prose. The *Hengwrt Chaucer* stands second among the seven manuscripts selected and printed by the Chaucer Society. In quality, Robert Vaughan's collection of Welsh manuscripts was not equalled, let alone excelled, by any of his contemporaries.

The manuscripts remained in the family up to the death of Sir Robert Williames Vaughan, Bart., of Nannau, Hengwrt, and Rûg, who bequeathed them to his great friend W. W. E. Wynne of Peniarth. On his death they passed to his son W. R. M. Wynne. In 1905 the combined libraries of Peniarth and Hengwrt, containing over five hundred manuscripts in Welsh, Cornish, English, Latin and French, were purchased by Sir John Williams, who gave them to the newly-founded National Library of Wales.

It may be of interest to note here that while at Peniarth the manuscripts were kept in a very handsome bookcase made from a large *Ilex* tree or holm oak which grew near the mansion until blown down during the gale which caused the wreck of the *Royal Charter* off the Anglesey coast. Apart from the decorative scrolls on the doors of the lower tier of cupboards, all the work was done by

estate craftsmen. The bookcase is also at the National Library.

NANNAU

In the popular imagination Nannau, which stands on high ground some three miles north of Dolgellau, is chiefly remembered as the home of Hywel Selau, kinsman of the fourteenth century 'Prince of Wales' Owain Glyndwr. Reputed to be one of the most stately houses in North Wales, the original house was built by Cadwgan ap Bleddyn, Prince of Powys; it was destroyed by Glyndwr during a punitive action which also resulted in the death of its owner.

According to one of several traditions, both men were walking through Nannau Park, when Hywel, feigning to take aim at a deer, turned and let fly his arrow at Glyndwr, and would surely have killed him but for the armour which he wore beneath his tunic. Never hesitant, Owain promptly slew his treacherous adversary, and before setting fire to the house secreted his body in a hollow oak tree where forty years later the gruesome discovery of the skeleton was made.

In July 1813 Sir Richard Colt Hoare saw this same oak—*Ceubren yr Ellyll* ('the demon's hollow tree') as it became known—the day before it fell victim to a great storm. This was the legendary oak to which Scott referred in the introduction to the Sixth Canto of *Marmion:*

> All nations have their omens drear,
> Their legends wild of woe and fear.
> To Cambria look—the peasant see,
> Bethink him of Glendowerdy
> And shun 'the spirit's Blasted Tree'.

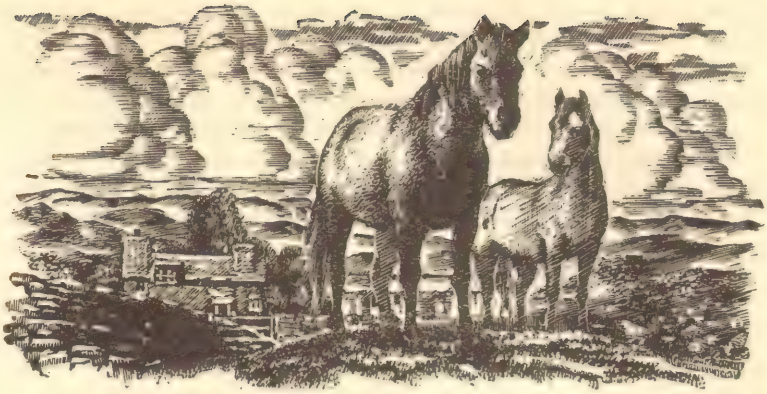
Many of the elegies written by contemporary poets credit Hugh Nannau (who died in 1623) with rebuilding Nannau. Its grandeur inspired them to liken it to St. Paul's and the 'White Tower', a magnificent palace with conspicuous chimneys, a noble white-washed clock-tower, with its 300 steps, the oaks of the roofs covered with slates and lead forming twelve great ridges or crests. Pennant reckoned it had probably 'the highest situation of any gentleman's house in Britain'.

Under Nannau's green hills lie the ruins of Cymmer Abbey in their pastoral solitude, noted even in 1774 for 'the large Scotch firs which grow here'.

Here we are in the vicinity of Coed y Brenin ('The Forest of the King'), so named to commemorate King George's Silver Jubilee in 1935. The Ganllwyd district on the left of the road leading to Trawsfynydd has long been famous for its trees, 'Coed Ganllwyd'

earned specific commendation in Edward Lhuyd's *Parochalia*, but its fame will forever be linked with the *Brenhinbren* ('King tree') which was felled in 1746. This noted oak-tree is reputed to have had a 'trunk of fifteen feet in length, and twenty-five and a half in circumference' . . . From the fork it divided into several branches, three of which extended to a further length of forty-five feet, and were large enough for mill-shafts'. The bark alone measured six tons so that it is little wonder that its praises were extolled in verses which are sung even to this day.

Nannau



Welsh Ponies

Pob hwsmoneth a fetha
Oni chedwir ar dir da.—Elis ap Rhys
Without good soil
All husbandry fails

THE AGRICULTURE OF MID-WALES

BY RICHARD PHILLIPS

The thinly populated waist-band of Wales, or its middle third, lying between the populous north and the industrial south, consists of a wide stretch of country of low land, middle land and upland sometimes described as the Barn, the Byre and the Fold areas. It is an area which has been almost entirely dependent upon agriculture as its main industry during the first half of this present century. That industry has been a decaying one and consequently has failed to maintain its population. The recent *Mid-Wales Investigation Report*, Cmd. 9631,* has shown that the major part of this belt of country has suffered extensively from depopulation because of the economic instability of its agriculture.

THE PAST

But it has not always been like that, for during the eighteenth and nineteenth centuries it was prosperous, maintaining a rich gentry and a large population of rural folk employed in the twin industries

* H.M. Stationery Office, 1955. Price 16s. od.

The homesteads of Hermon, far up the Afon Wen valley amid the woodlands of Coed y Brenin

The farmstead of Cwm Cadian, in the midst of Dovey Forest

The Mawddach Estuary, between Dolgellau and Barmouth, with Coed y Garth on its left-hand shore, and Waterloo Wood on the right; Coed y Brenin

Looking north across the Mawddach from Penmaenpool to Waterloo Wood and Foel Ispri; Coed y Brenin

The view down the Afon Wen valley, from Hermon towards Cader Idris; Coed y Brenin

The still water of Tal y Llyn, between Dolgellau and Towyn

Rhaidr Du, the Black Waterfall, in the National Trust's woods at Ganllwyd, close to Coed y Brenin

of agriculture and lead mining. The latter provided large fortunes to the owners but early decease for the miners, for lead is a poison to man, beast, fowl and fish. Large upland villages sprang up around the lead mines, such as Y Fan, Dylife, Staylittle, Cwmystwyth, Goginan, Talybont and Pontrhydfendigaid, as well as many minor hamlets of a few rows of houses and barracks. The co-existence of the two industries brought prosperity to the whole countryside. Farmers found a market at their doors, whilst the lead ore had its market farther afield. In those days, even the small market towns dotted within this area, such as Aberystwyth, Newtown and Llanidloes, developed their smelting and engineering works to supply the miner with plant and repairs. So high was the status of the farmers, large and small, amongst the miners, that they had the desire and the ambition to occupy land, however rugged and small. Thus were created the many small-holdings in this area —*y tyddynod*—where the miner and his family could live and derive additional perquisites to add to their earnings from the mines.

Eventually, the importation of cheaper lead ore from overseas and the near completion of the extraction process, brought ruin to this once flourishing industry, and by the turn of the present century many of the mines were derelict and in utter ruin. The loss of work and wages brought poverty and starvation in its wake which forced the out-of-work miners and their families to move elsewhere for their sustenance. Consequently the industrial villages and small country towns decayed and this in its turn meant the loss of the market to the farmers, for the country now lay remote from densely populated areas. Agriculture fell on evil days and many of the smaller holdings failed to survive. When the imports of cheap wheat, meat and other foodstuffs arrived from overseas before the end of the nineteenth century, the prospects of the survival of the small farm almost disappeared and abandonment proceeded at a faster pace. Emigration and depopulation, followed by amalgamation, became the general pattern of social disintegration, and in some respects this became a land of ruins—those of castles and monasteries had already become respectable, but those of lead mines, villages, cottages, farms, schools and chapels were considered deplorable.

The story in the *Mid-Wales Report* is the continuation of this disheartening tale which is likely to remain until other industries and occupations come to co-exist with agriculture.

However, after the end of the First World War, this country realised its poverty in home-grown timber. In 1919 the Government established the Forestry Commission to remedy this defect in the national economy, by adopting a policy of afforesting some of the uplands. Forestry was acclaimed as a new industry which could save

rural Wales. Progress in planting, however, was slow and by 1945, in a quarter of a century, only 80,000 acres had been planted in Wales. In the meantime some hostility had been created against the policy of the Commission taking good sheep uplands to grow timber. After the Second World War, the 1945 Forestry Act put new life into afforestation, and already in a matter of 13 years, over 120,000 more acres have been planted. The ultimate aim is to plant over three-quarters of a million acres in Wales before the end of this century, and the mid-Wales belt may well contribute one-third of that total. It is hoped that in time the forest labour force (of the Commission, private owners, and industrial firms) will become large enough to reinvigorate the social community in the countryside.

The *Mid-Wales Report*, and more recent ones too, are very hopeful that forestry will fulfil these expectations, and that it will become thoroughly and intimately integrated with agriculture. When the two industries co-exist in this blissful state, then prosperity is assured, not only in the countryside but also in the neighbouring small market towns.

But agriculture must also do its share in the social and economic reconstruction, and the three levels of country already alluded to must each contribute, through its particular system of farming, to the general benefit. These three levels or zones of country, Barn, Byre and Fold, are not well defined and do not follow particular contours, but they exist all the same. The differences between them in elevation are not enormous, for the highest point is barely 3,000 feet above sea level. But the differences in climate, and consequently in fertility of the soil, are such as to force upon the farmers three distinctive and inter-dependent systems of farming. Whereas climate is largely beyond human control, fertility can be materially improved by husbandry such as drainage, enclosure, cultivation, liming, manuring, cropping and managing. As a general rule, it may be asserted that where the climate is kind in terms of low rainfall and moderate temperatures, then modern husbandry yields excellent results. In contrast, where the climate is unkind, then husbandry methods, however efficiently practised, can never yield anything like comparative returns. This will become evident in the description of the three zones.

THE BARN COUNTRY

The Barn area consists of the low-lying coastal and inland valley areas with a rainfall of less than 40 inches annually, a mild climate and an early spring. The soils are naturally fertile and easily improvable, so that it is suitable for both arable and pastoral farming. Modern techniques enable the land to yield two tons of grain per

acre and over 12 tons of potatoes, just as it is possible to produce early summer lambs of 45 to 50 pounds, average carcase weight. Cattle can also be fattened early in the grazing season and large quantities of milk produced throughout all months of the year. Even a relatively small holding can provide sufficient income for the farmer and his family, pay the rent and save something for the proverbial rainy days. Mechanisation has enabled fewer workers to produce more from the land, so that the farm workers cottages of former days have either become derelict or have been renovated by the prosperous holiday visitor. Unfortunately there is only a small proportion of this type of land in the whole of Wales and even less in this mid-Wales country, consequently its contribution to the general economy is small. However, it utilises the draft ewes from the uplands for its flying flocks, and it accommodates hill ewe lambs as tack, or paid keep, over the winter.

THE FOLD COUNTRY

At the other end of the scale, in the Fold or the Upland area, the conditions are very different. Most of this land is beyond the upper line of cultivation and falls in the category of rough grazings devoted almost entirely to hill sheep farming, and in some areas to the breeding and rearing of Welsh mountain ponies as well.

The system is quite different from any other practised in Wales for several reasons. In the first place, it is open to many risks and hazards such as snows, blizzards and severe frosts like that of 1947, which can destroy nearly the whole agricultural capital of the occupier in less than a month, which will take years to rebuild. Again, when its livestock products such as draft ewes, wether lambs and wool were a drug on the market, as in the 1930's, then abandonment and the subsequent amalgamation of holdings resulted, and empty houses and derelict homesteads became common sights in this hill country.

The system of hill sheep farming can be sustained, for long periods, only when four different age groups of females are kept; the youngest or ewe lambs are ready to enter the flock when the four-year-old draft ewes depart from it to form flying flocks on lowland farms. This regular annual process of replacements reduces the elasticity of the system, so that whenever changes of policy are necessary, it must take time to accomplish. Further, hill ewes have to be acclimatised to their own hills or hirsels or *cynefin*, so that they do not stray even when their grazing grounds are not enclosed by a fence. Improvements must therefore come from within each flock, and that is also a slow process. Without this instinctive homing habit in hill sheep, this system of farming would not be a practicable pro-

position, for not only does it ease the task of shepherding but it also enables the sheep, when foreboding storms are likely, to migrate to sheltered spots within their own ground. The system also depends upon a small hardy type of sheep which can subsist and survive on the minimum fare, for their natural hill pasture grass is extremely poor in energy-giving food constituents, as well as in the health-giving minerals and vitamins. On the westerly side of the watershed, the small hardy Welsh ewe is kept, whereas on the easterly slope a somewhat bigger speckled-face sheep of the Kerry Hill type is favoured. In hard weather these sheep can survive semi-starvation and mineral deficiency for long periods.

The returns per acre are low and indeed there can be no expectation of spectacular cash yields when the rent is less than half a crown per acre. In periods of depression no farmer is anxious to speculate in sheep farming, just as in periods of prosperity, when hill ewes fetch £5 each, there is hardly a sheep farmer who can afford the necessary capital for expansion. Fortunately the Forestry Commission is ready to acquire the plantable acres on the uplands, for this is excellent conifer-growing country. The conflict between sheep and timber growing remains, and although the old hostility has largely disappeared, yet the economic challenge has come to stay. Nowadays the more active and far-seeing hill farmers have secured benefits under the Hill Farming Act, as well as help from scientific research workers. The practice of keeping herds of hardy breeding cattle on the hill grazings all the year round, so as to improve the pastures for sheep, is a modern development that has proved both effective and profitable.

In the field of research, the process of land reclamation, as developed by Stapledon and Bennett Evans on the Plynlimon range, proves that, with lime and phosphate, cultivations and the use of persistent leafy pasture grasses and clovers to form new swards, the economic benefits in increased numbers and heavier weights of sheep and wool are enormous, and a further challenge to forestry. This system of sheep farming, however, suffers from the difficulty of over-wintering the flocks, for this is a land of long severe winters of seven months or more.

The general policy is that of flock migration, holding the flock on the uplands during the nursing period of summer, and bringing them down to low-lying sheltered land to over-winter. In the old days this was resolved by a system known as *hafod* and *hendre*, the former being the summer abode of the family and the livestock, and the other, in the lowlands, their winter quarters. This old tradition eventually changed into that of two separate familes, the one becoming the upland flockmaster and the other the lowland

farmer, each with his own possession. The former charged the latter for summer grazing his sheep on the hills and the reverse payment was for winter tacking the youngest age group on the lowland. The lowland pastures were winter-let as it were, and the practice remains to this day. Upland Breconshire farmers continue to send their ewe lambs on to lowland Cardiganshire farms to over-winter, but the cost of transport and of tack is now high, whilst owing to the development of dairying it becomes harder to get each year. As a result two developments have taken place to overcome these difficulties.

One method has been to build slatted floor sheds to accommodate larger numbers of the ewe lambs overnight and to provide hay in the racks for them, and then to turn them out to reclaimed hill pastures in the day-time. It is a very promising system and is reputed to cost less than tacking.

The alternative is, where a lowland farmer acquires another farm on the uplands or vice versa, as the case may be, and runs the two together as one unit in a modified version of the old *hafod* and *hendre* system. The hill farm is ring-fenced and shepherding is done by Land Rover visits. This 'absentee shepherd' system is naturally disliked by the true hill flockmaster, yet it is a plan that has worked well.

Hill sheep farming continues to be practised in this vast thinly populated area. The sheep are fairly thick on the ground, amounting to one per acre over large tracts, and this concentration is more than in many other hill districts of this country.

THE BYRE COUNTRY

Lying in between the lowlands and the uplands is the Byre area, which as the name implies is devoted to livestock farming with the ruminants (cattle and sheep) the most numerous, and grass the most important crop. It lies between the 400 and the 700 foot contours, and is the most important section socially and agriculturally as well. The westerly countryside suffers from fairly heavy rainfall, of over 60 inches, but the easterly slopes get considerably less, amounting to 35 inches or so on the borders with England. It is a land of many small farms which are apt to be economically unstable. Most of this area of hill and dale is divided up into farms and fields, with the steeper slopes of the valley sides growing scrub, or else being replanted by the Forestry Commission.

The plough continues to be used to produce arable fodder crops for winter feeding, for this is the land where mixed farming flourished in the past and where the Welsh cobs and ponies, hardy cattle, sheep and pigs are indigenous. The inhabitants too, continue to devote their activities evenly between their vocational farming

duties and other cultural enjoyments and pursuits. But already many of the smaller holdings have fallen to the lure of amalgamation, and the people have dispersed to work elsewhere or have gone into the professions through the improved educational facilities now available.

The passing of the Marketing Act in 1931 and the establishment of the Milk Marketing Board two years later brought prosperity into this area, which had suffered so much from the depression of the 1930's. On the westerly side the market was at the doors of the farmers once again; for the lorries collected the milk to the local factories and depots each day. On the easterly side, however, the farmers clung to the traditional livestock rearing system, producing their early maturing Hereford store cattle for the Midland graziers to fatten into prime beef. In this, as in other respects, the two sides of the Plynlimon range are quite different. On the east, the native Welsh language has disappeared from everyday use, but the farmers cling to their traditional system, whereas on the west the Welsh language persists with even greater vigour, but the old system of farming has been abandoned, and farmers have experimented with this or that specialised dairy breed in order to enhance the figures on the monthly milk cheques. But on both sides, the expansion of agriculture through land reclamation and advances in technical skill have been highly successful.

The production of summer fat lambs during the holiday season, either from flying flocks or from permanent grass sheep, is a leading output, and the over-wintering of ewe lambs from the hill farms as a side line shows how inter-dependent the different sections are on one another. Pigs and poultry have never been large contributors to the farming income, although the mixed farming system demands that a modest attempt be made to develop them. But farm mechanisation has proceeded apace. With the ever-increasing numbers of stock kept, buildings have had to be expanded, often under assisted Farm Improvement Schemes. Altogether, the farmers of the Byre area have enjoyed a remarkable degree of prosperity since the war, whilst mechanisation has eased the physical burdens and reduced the numbers of men employed on the land.

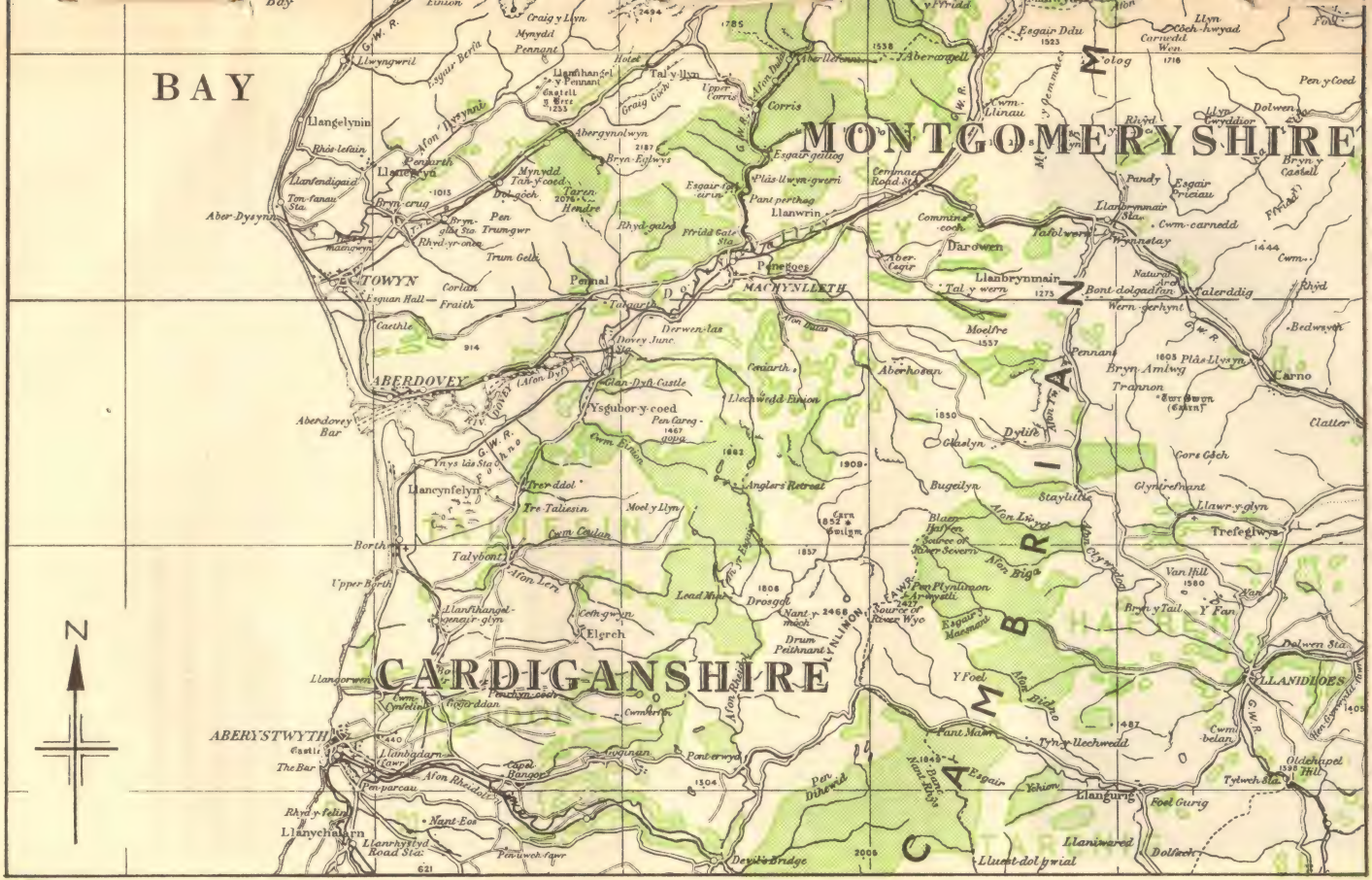
THE FUTURE

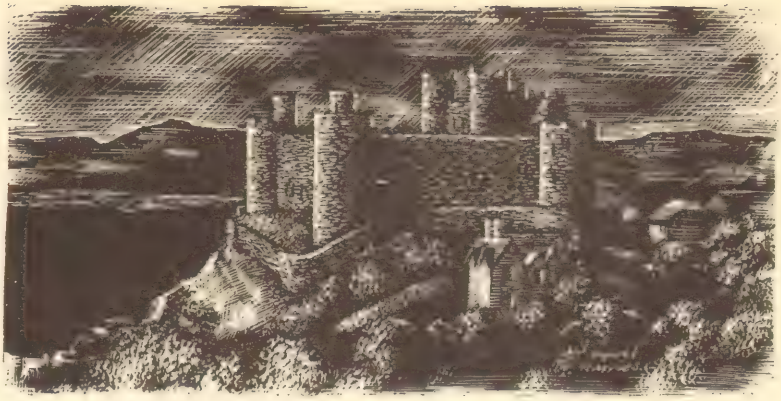
But the old social order is changing. With the transport facilities that are now available, the diminished population and the penetration of other forms of entertainment into the homes, such as radio and television, the churches and chapels are not the sole centres of the cultural activities of country people. Indeed, to some extent, it may be asserted that whereas the pews are empty on Sundays and

week nights, the attendances at the Young Farmers Clubs and Women's Institute meetings have been encouraging, and there is therefore still hope for the cultural activities of the rural areas to be maintained for future generations.

The future prosperity of this waist-band of Wales, extending to over a million acres of land, must rest upon the mutual support of the twin industries of agriculture and forestry. In order to secure it, it is necessary to consider not only the economics, housing, amenities and social conditions but also the education of the young people who will live here. They must be given the opportunities through education, to understand that the two industries must be integrated amicably together to provide work that is attractive and dignified, as well as economic conditions that are secure for a long time to come.

NORTHERN CAMBRIAN FORESTS
Commission Forests
Other Woodlands
Forest Names
DOVEY
5 0 5 Miles
CAERNARVONSHIRE
MERIONETHSHIRE
CARDIGAN
BLAENAU FFESTINIOG
PORTMADOC
HARLECH
DOLGELLEY
BARMOUTH
BALA
To BALA
Tremadoc Bay
Barmouth
CADER IDRIS
ARENIG


BAY
MONTGOMERYSHIRE
CARDIGANSHIRE
CAMBRIAN MTS.
ABERYSTWYTH
ABERDOVEY
MACHYNLLETH
LLANIDLOES
Llangelynin
Llanegryn
Llanfendigaid
Aber-Dysynni
Bryn-crug
Tywyn
Pennal
Corlan
Caethle
Derwen-las
Glan-Dyfi Castle
Ysgubor-y-coed
Aberdovey Bar
Llancynfelyn
Tre'r-ddol
Tre Taliesin
Borth
Talybont
Upper Borth
Llanfihangel-genau'r-glyn
Elgreh
Llangorwen
Llanbadarn Fawr
The Bar
Pen-parcas
Llanychaiarn
Llanbadarn Road Sta.
Devil's Bridge
Llanwrin
Darowen
Llanbrynmair
Moelfre
Aberhosan
Dylife
Bugeilyn
Staylittle
Llawr-y-glyn
Trefeglwys
Carno
Clatter
Llanidloes
Van Hill
Y Foel
Pant Mawr
Llanguric
Llaniwared
Dolfach
Llwyngwril
Llangelynin
Abergynolwyn
Corris
Aberllefenni
Abercarrell
Llanwrin
Pantperthog
Penegoes
Derwen-las
Aberhosan
Llechwedd Einion
Anglers Retreat
Drosgol
Nant-y-moch
Source of River Wye
Pen Plynlimon Arwystli
Llyn Llygad Rheidol
Pont-erwyd
Pont Rhydfendigaid
Llanfihangel-y-Pennant
Mynydd Pennant
Craig-y-Llyn
Tal-y-llyn
Upper Corris
Abergynolwyn
Bryn-Eglwys
Esgair-geiliog
Esgair-tal-eirin
Mynydd Tan-y-coed
Bryn-crug
Pen-Trum-gwr
Rhyd-yr-onen
Trum Gelli
Fraith
Eiguan Hall
Tonfanau Sta.
Aber-Dysynni
Rhos-lefain
Afon Dysynni
Afon Dovey
Afon Leri
Afon Ceri
Afon Rheidol
Afon Ystwyth
Afon Lledr
Afon Llyfnant
Afon Twymyn
Afon Clywedog
Afon Severn
Afon Banw
Afon Bidno
Afon Marteg
Afon Garno
Afon Trannon
Afon Lwyd
Afon Big
Afon Hirnant
Afon Tarenig
Afon Einion
Afon Dulas
Afon Rheidol
Afon Ystwyth
Afon Leri
Afon Dovey



Harlech Castle

Lle gynt y bu'r gwynt yn gwau
Daw dyn a diwydiannau
Where once the wind went weaving
Man brings his industries along

ANTIQUITIES AND HISTORY

BY PROFESSOR E. G. BOWEN

The area within which the Cambrian Forests occur may be described as the countryside lying behind the coastlands of the inner curve of Cardigan Bay. The land itself rises steeply from the shore to give both moorland and mountain country, whence several rivers flow eastwards inland or westwards towards the coast. The peninsulas formed by Lleyn and Anglesey to the north, and by Pembrokeshire to the south, jut out beyond these lands of Central Wales far into the Irish Sea. This basic geographical factor has had a profound influence on the history of the Cambrian coastlands, for right up until the days of modern transport it has been easier to move from one part of Wales to another by sea rather than by land. So the western jutting peninsulas had the great advantage of reaching into the main streams of seaborne traffic which flowed along the western sea-routes, while the central section of the coastlands were left, set back, as it were, from the main streams of activity. One of the first things we are reasonably certain about, therefore, is that the earliest inhabitants of these parts had close contact with the sea and another is that throughout prehistoric times and, in fact, right down to the present day, this part of Wales was, of necessity, a thinly-populated territory.

Near to the foreshore just south of Aberystwyth, where the Rheidol and Ystwyth rivers now meet, is the site of a Mesolithic flint chipping floor—the earliest evidence of the presence of man within the area. It is thought that the raw material for this primitive factory was obtained from the nearby pebbles on the storm beach which themselves must have been transported considerable distances by the glaciers that once reached down the Irish Sea. We are certain of this, as flint does not occur in the local rocks, and flint pebbles are still to be found on the storm beach. Very little is actually visible on the site, but careful examination of the soil in the vicinity soon yields evidence of worked flints.

THE MEGALITHIC AGE

The earliest visible remains of human occupation are the structures built of great stones, called megaliths by the archaeologists, but usually the Welsh name *cromlech* is used locally. These monuments were originally covered by great mounds of earth or stones, and they represent the remains of the collective burials of people who migrated into these western parts of Britain from the Mediterranean lands around about 2,000 B.C. Characteristically, the north-western and south-western peninsulas of Wales are thickly dotted with these monuments, while in the area under review they occur only on the Ardudwy coastlands in the north—a region which has frequently received cultural overspills from the north-western province of Wales. The importance of the western peninsulas for sea-derived cultures is thus immediately apparent. The pair of *cromlechau* at Dyffryn (still standing in the remains of the great mound of stones that originally united and covered them) is very attractive, so also are the two long cairns known as Carneddau Hengwm.

Another interesting site usually linked with the megalithic age is that of the churchyard of Yspyty Cynfyn, between Ponterwyd and Devil's Bridge in Cardiganshire. Here several large stones (possibly representing the remains of a megalithic circle) are incorporated into the present churchyard wall. The site has often been instanced as a remarkable case of the continuity of traditional sanctity from prehistoric into Christian times, but, unfortunately, some doubt exists concerning the original venue of the large stones.

A considerable area of the high ground throughout the region is dotted with small round barrows or cairns of various sizes, which are often marked on the Ordnance Survey maps as *tumuli* or *carneddau*. They mark the graves of the later inhabitants who succeeded the megalith builders and who possibly survived in these

parts until the coming of the Romans. When these mounds are opened they frequently contain the partly-cremated remains of an individual placed in a cinerary urn which, in turn, has been deposited in a grave made of stone slabs. Sometimes, as in the large round barrow situated on the summit of Dysgwylfa Fawr (1,661 ft.), about $2\frac{1}{2}$ miles north-east of Ponterwyd in Cardiganshire, we have another arrangement of grave goods. This barrow contained two dug-out canoes, one inside the other. The smaller one held a heap of cremated human bones and a small flint blade, while adjacent to it was a food vessel standing on its base. The idea of a boat carrying the spirit of the departed over the dark waters separating this world from the next may hereby be traced back in western Wales to the beginning of the Bronze Age. In the late Bronze Age some of the cremation urns assumed an elaborate form, as for example the encrusted urn found at Penlleyn in Cardiganshire.

THE IRON AGE

It is only when we come to the pre-Roman Iron Age that we encounter an important formative period in the life of Wales, and of this region in particular. The Iron Age was a period of turmoil and strife throughout most of western Europe, and displaced tribes were seeking new homes along the outermost fringes of the continent. The archaeologists call that Iron Age culture which spread by the western sea routes into the south-west peninsulas of England, Wales, Ireland and Western Scotland, the *Iron Age B* culture, to distinguish it from other cultures of Iron Age peoples invading southern and south-eastern England at this time. The *Iron Age B* peoples, from about 250 B.C. onwards, established the great hill-forts that are so prominent on the middle slopes of the high ground throughout the Cambrian Forest area. The hill-fort dwellers practised a pastoral economy with a little arable farming; hunted in the dense forests that filled the valleys; most likely moved up to the higher moorland in summer time with their flocks and herds. In autumn they returned to their hill-forts again.

There are several important hill-forts within our region. Pen Dinas on a 400 ft. hill overlooking Aberystwyth is perhaps the most spectacular and best known. It has excellent natural defences on the seaward slope and a triple rampart defence on the weaker landward side. Other clearly marked forts of this era in the Cardiganshire area include Penybannau near Strata Florida; Gaer Fawr, Trawscoed; Castell Mawr, Llanrhystyd; Dinas, Ponterwyd; Caer Pwll Glas, Llandre; and Pendinas, Elerch. In Merioneth we have similar well-known hill-forts at Pen Dinas, Llanaber; Tyddyn y Coed, Brithdir; and Castell Mawr, Llangelynin.

It is now generally agreed that the Roman occupation of this part of Wales was little more than a military interlude, for the native *Iron Age B* culture continued to exist side by side with the occupation, and to survive the withdrawal of the Roman garrisons. Only slight evidences of the Roman occupation remain in these parts. From south to north through the area runs the track of a Roman Road that was designed as part of the general frontier system of defence, and shows no relationship with the coast. From the auxiliary fort at Llanio, some three miles south of Tregaron (where five inscribed stones have been found) the road is fairly certain for some nine miles to the northward. Subsequently its track can only be traced with difficulty, but it certainly headed towards another auxiliary fort at Pennal, north of the Dovey Estuary, below Machynlleth. The course of the road through the lower hill country of western Merioneth can only be surmised, but it makes for the well-known auxiliary fort at Tomen y Mur, in the parish of Maentwrog.

We are certain that many of the native folk, during the Roman occupation, lived in huts, the foundations of which are still to be found on the hill sides. They continued to live in settlements of this kind for many centuries to come. Much attention has been given in recent years to the archaeology of these hutments, and a particularly interesting group labelled 'concentric circle' settlements is found in north-west Wales. Some of these occur in the northernmost part of our region in western Merionethshire. Such are the Muriau Gwyddelod, Llandanwg; Egryn Fort, Llanaber; and Eglwys y Foel, Llangelynin. The interesting feature of this type of settlement is that the huts do not appear to be associated with terraced fields or with the tilling of the nearby land. Their owners appear to have been exclusively cattle pastoralists—a race of conquering aristocrats—in all probability the sons of Cunedda—those fifth-century invaders of North Wales from North Britain, whose princes gave their names to the present counties of Merioneth and Cardigan.

Towards the close of the Dark Ages the inhabitants of Wales changed their custom of living in round houses to living in rectangular shaped dwellings. We do not know where, or exactly when, this took place, but recent archaeological work in both North and South Wales is revealing small oblong house platforms of earth and stone cut into the hill sides. These would appear to be the bases of rectangular shaped homesteads. Many, no doubt, have been built over and underlie present farmsteads and possibly some of the great houses of the countryside. Most of these house platforms yet discovered are found in the northern part of our area.

One of the most important features of life in these parts in the post-Roman centuries was the coming of Celtic Christianity. It is only within recent years that we have been able to appreciate the importance of the western sea-routes in this connection. Early Christian inscribed stones, in Latin, are not numerous in this area as they (being sea-derived) tend to concentrate in the North-Western and South-Western peninsulas. Nevertheless, as with the Megalithic monuments, which preceded them by two thousand years, some very early examples were found in western Merioneth, within a mile of Llanaber Church, where they are now to be seen. An interesting stone belonging to this series was discovered about 1945, completely buried in the ground, at Llangwyryfon in north Cardiganshire. This is probably an outlying example of the Latin inscription of the south-western province of Wales. It is now in the National Museum of Wales, Cardiff.

Along these same western seaways we may trace the movements of the Celtic Saints, Cadvan, Illtud, Tydecho, Padarn and Dewi, and a host of others, to establish the sites on which so many of the present parish churches now stand. The parish churches are dedicated in many cases to their founders, as was the Celtic custom, and not to members of the Holy Family or to Biblical Saints. Originally these churches were simple wattle and daub buildings; hardly any portions of the stone structures that we see date beyond the thirteenth century, and very few of them can claim anything of that antiquity. Among the more interesting churches in the Cambrian Forest area may be mentioned Llanaber, Llanfrothen, Llandanwg, Llanddwywl and Dolgellau in the north and Llanbadarn Fawr, Llanddewi Brefi—important centres of the Padarn and Dewi cults respectively—in the south.

Within this region also stand the ruins of two famous monastic houses—Cymmer Abbey in the north, and Strata Florida Abbey (Ystrad Fleur) in the south. Both were Houses of the Cistercian Order, and we know that in the Middle Ages the monks of this Order worked in close association with the sheep farmers of the wild hills amid which they were located. Strata Florida was established in 1164, a daughter House of Whitland in Carmarthenshire, which in 1140 was colonised directly from Clairvaux in Burgundy. Cymmer came later; it was founded in or about 1199 and was colonised from Cwmhir in Radnorshire, which, in turn, was another daughter house of Whitland. Both Houses received numerous benefactions from the Welsh Princes, who greatly favoured the monks of this Order.

The remains of the earth and timber castles of the Norman ascendancy, subsequent to the first quarter of the twelfth century, are fairly frequently found hereabouts, but more so in the Cardiganshire and Montgomeryshire region, than in Merioneth. This is because the latter territory belonged to the native principality of Gwynedd which remained independent until the time of Edward I. Castell Gwallter, on the plateau above Llandre in north Cardiganshire, is an excellent example of one of these motte-and-bailey castles. It was built by Walter de Bec (hence its name) during the Norman Conquest of Cardigan by Gilbert de Clare, 1110-1135. The mound, on which stood originally a wooden tower, and the surrounding ditch are clearly visible, and the remains of the bailey, or outer courtyard, lie to the northward. Other well-known castles of this general type are the original Aberystwyth Castle at Tan-y-castell (Tanybwlch); Castell Meurig, Ystrad Meurig; Castell Gadwgan, Tomen Llanio and Caerwedros.

The Cambrian Forest zone includes the ruins of two great stone castles—Harlech and Aberystwyth, and then just beyond its limits to the north is Criccieth Castle, and beyond its southern limits, Cardigan Castle. The last-named is the oldest of them all and has the most chequered history. A strong fortress was erected on this site very early in the Norman ascendancy and was rebuilt by Gilbert de Clare in 1166. After a frequent change of hands between Norman and Welsh, the Lordship castle and town of Cardigan were settled by Henry VII on Catherine of Aragon, on her betrothal to his eldest son Arthur, Prince of Wales. Criccieth Castle in Caernarvonshire is magnificiently situated on an isolated conical hill. It is said that Ednyfed Fechan, the chief advisor to Llewellyn the Great, built a strong fortress here which, having fallen into decay, was restored and enlarged by Edward I as part of his consolidation of Gwynedd after 1282. Likewise, the records of the far larger castle at Harlech indicate that the King was not the first to appreciate the potentialities of this magnificent site. Most of the stone work here dates from 1286, and under the care of the Office of Works it is now in a fine state of preservation. The remaining great stone castle in the area is that of Aberystwyth. This owes its origin to the elaborate preparations made for the conquest of North Wales in the last quarter of the thirteenth century. Edmund of Lancaster, the King's brother began the building of Aberystwyth Castle in 1277, and soon a free borough of Anglo-Norman settlers grew up within a little walled enclosure beneath its shadow.

The Edwardian campaign and the great castles left in its wake saw the end of native rule all over Wales. After the eclipse of the

native princes it may be said that it was the local squires who carried on the traditions of the Welsh people, certainly down to Tudor times, and in some cases, until very much later. A few of their houses are still extant, naturally considerably modified, but, nevertheless, providing an interesting link in the countryside with the social life of the past. In Merioneth there is a most interesting house called Egryn. Here, enclosed in its sixteenth-century walls are the lower portions of the timber arch which once carried the roof of the medieval hall. Other important houses in western Merioneth are Glyn Cywarch, Cors y Gedol, Lasynys, Dol y Moch and Hengwrt. In Cardiganshire there are Wern Newydd, and Llwyndaffyd where Henry Tudor stayed on his way to Bosworth, as well as other famous houses (some now in ruins) such as Hafod Uchtryd, Gogerddan, Nanteos and Old Trawscoed. The fate of the latter is typical of these large houses today. After being entirely rebuilt in the eighteenth century, when it became the home of the Vaughans, it now serves as the Headquarters of the Agricultural Advisory Service for Wales.

Wild mountain goat kids

The Vale of Rheidol, bordered by the woods of Rheidol Forest; the railway from Aberystwyth to Devil's Bridge runs on the right-hand slope

Llyn Cau, Cader Idris

The Waterfall at Bryncyn fil, an outlying portion of Dovey Forest, south of Machynlleth

Rheidol Gorge

Holltir cregiau
A'u tro'n llynnau
Edmund Prys
Crags are cleft
And turned to lakes

PHYSICAL FEATURES AND GEOLOGY

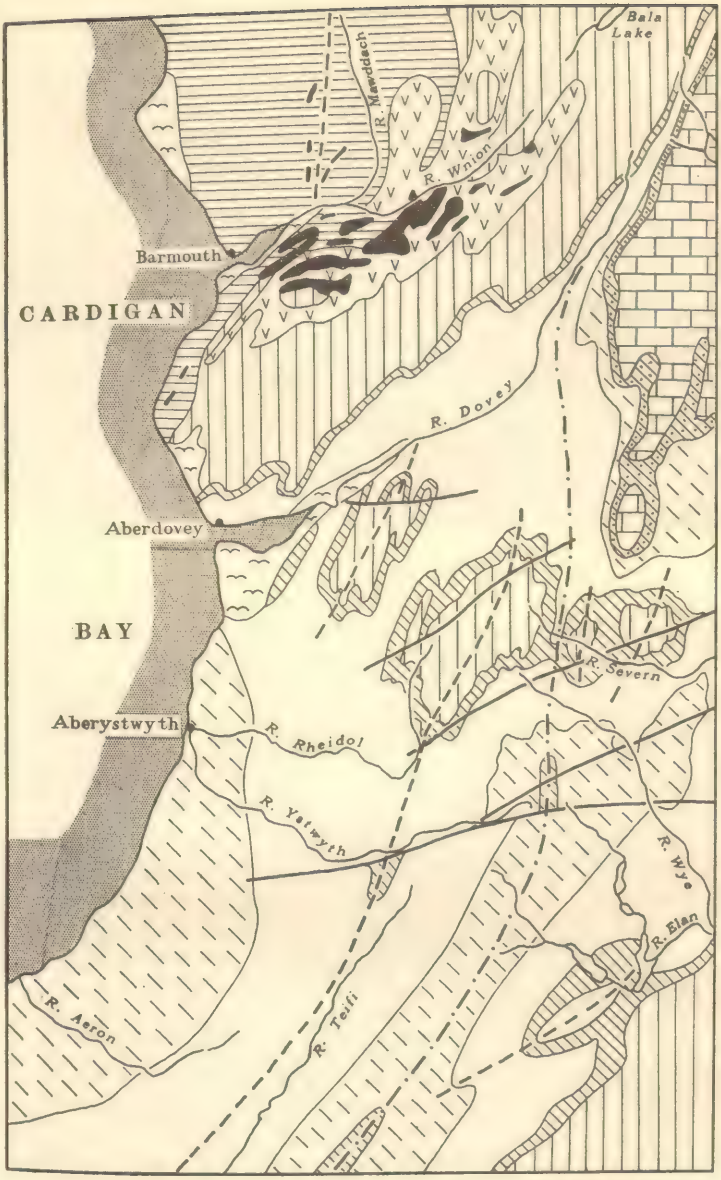
BY JOHN I. PLATT

PHYSIOGRAPHY

The Cambrian Forest area stretches from Cardigan Bay, between Aberaeron and Harlech, approximately to the heads of the valleys of the rivers which enter that coastal stretch. The two largest rivers make deep incisions into the region; they are the Mawddach, whose main tributary the Wnion rises only five miles from Llyn Tegid or Lake Bala, and the Dovey. These rivers divide the area into three physiographic units.

The northern unit is the Harlech Dome, which is an area of high relief with several peaks rising over 2,000 feet above sea level. The highest are Y Llethr (2,475), Diphwys (2,462), Rhinog Fawr (2,362), and Rhinog Fach (2,333), which all lie west of the Dolgellau—Trawsfynydd road, while Rhobell Fawr (2,408) dominates the country to the east of the road.

South of the Mawddach estuary lies the Central Wales Plateau, which naturally divides itself into a High Plateau and a Coastal



Geological Map

Key to Geological Map

Plateau, both of which can be clearly seen from a shaded contour map; they are most striking when seen from any high view-point. The High Plateau rises to over 2,000 feet in the northern part though it reaches only 1,800 feet at the southern margin. The High Plateau is dominated in the north-west by the Cader Idris range (2,927) which is continued north-eastwards in Aran Fawddwy (2,970) and Aran Benllyn (2,901). This lies north of the Dovey valley, which ends in the pass of Bwlch y Groes (1,790), and it forms a distinct physiographic unit; while that part of the High Plateau south of the Dovey valley is dominated by the Plynlimon mass (2,468).

The Coastal Plateau lies south of the Dovey estuary and forms a strip along the coast widening from about five miles in the north to about 12 miles in the south, and gently rising from between 400 to 600 feet near the coast to 800 feet inland. Standing out of the plateau is Mynydd Bach (1,185), which forms an upland area five miles long and two miles wide with a general level around 1,000 feet.

The area is drained by the rivers Mawddach, Dovey, Rheidol and Ystwyth, all of which flow westwards and in their middle courses show evidence of rejuvenation and encroachment upon an older drainage system in an advanced stage of maturity which, particularly south of the River Dovey, had a N.N.E.—S.S.W. direction and is now represented by the River Teifi from Ystrad Meurig to Lampeter.

GEOLOGY

This forest area lies in the heart of Wales, in a region which has been made famous in the annals of geology and has left an indelible mark upon the whole of the science. Here, in the first half of last century, pioneers in stratigraphical geology investigated the rocks; their discoveries were epoch-making and have been of fundamental importance not only locally but to world geology. No area of its size throughout the world has had such an influence upon the advancement of the science.

The rocks in the area belong to the Lower Palaeozoic era and, as a result of their systematic investigation, the time sequence was worked out and the stratigraphical systems and their sub-divisions (series) named, defined and delineated.

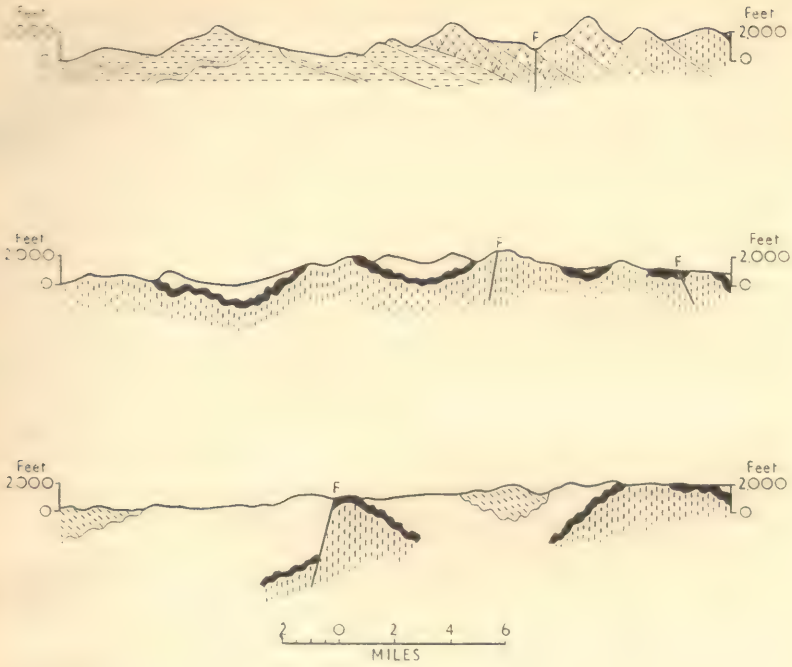
The succession of the sedimentary rocks of the area is given below; the names listed there (all of which are of places in Wales and the Welsh borders) are those given to rocks of the same age and characteristics (lithological and faunal) wherever they are found throughout the whole world, whether it be in America, Russia, Antarctica or elsewhere.

Eras (Groups)	*Systems*	*Series*
Lower Palaeozoic	Silurian	Wenlock
		Llandoverian
	Ordovician	Bala
		Llandeilo
		Llanvirn
		Arenig
	Cambrian	Tremadoc Slates
		Lingula Flags
		Clogau Shales
		Harlech Grits

Pre-Cambrian (not seen in this area)

The *Cambrian* rocks are confined to the Harlech Dome with a narrow strip, one mile wide, south of the Barmouth estuary.

Massive grits, some of them greywackes, are dominant throughout, and are responsible for much of the rugged inhospitable



GEOLOGICAL CROSS SECTIONS

Top: Sketch section from Harlech through Rhinog Fawr, Rhobell Fawr and Aran Benllyn

Centre: Sketch section from Towyn through Plynlimon towards Llanidloes

Bottom: Sketch section from Aberystwyth through the Pontrhydygroes inlier

Note. F=Fault.

mountainous country. Flags, slates and shales have a considerable aggregate thickness and form the hollows and the lower peripheral country. Mining and quarrying for slate is still carried on but its importance is waning; gold, iron, copper and manganese ores have been mined in the past, and the Dolgellau beds are radio-active, but of low grade.

The main outcrop of the *Ordovician* stretches from the coast at Towyn to Bala and beyond, and here the succession is almost complete through the series. Inliers occur within the Silurian farther south, as domes and anticlines in which Bala rocks are exposed.

Shales, mudstones and slates are important, and these give way in part to massive grits in the Bala series. Igneous rocks, however, are dominant, and because of their higher resistance to weathering are responsible for much of the mountainous country in the Cader Idris range. The end of the Cambrian period was marked by intensive volcanic activity, and Rhobell Fawr is a basal wreck of a central-type volcano, the lavas and associated rocks being andesitic. Volcanic ashes and lava flows occur throughout the Arenig, Llanvirn and Llandeilo series, and two petrographic types predominate viz. acid rhyolites and basic spilites, the later forming excellent pillow lavas on Cader Idris. Thick granophyre sills occur as well as extensive dolerite sills, dykes and plugs, many of which pierce the Upper Cambrian. Slates have been extensively quarried and mined in the Corris area, and some iron-ore has been mined around Cader Idris.

The *Silurian* rocks are represented by the Llandoverian series in the area under consideration, except for an overlap of the Wenlock series in the north-east.

They consist for the most part of shales, a few slates, mudstones, flaggy mudstones and flagstones. Impersistent grit bands which pass into coarse conglomerates occur near the base of the series in the Drygarn area. Grits become more important in the Upper Llandoverian, the Aberystwyth Grits consisting of alternating shales and grits, which form a typical greywacke series which are of particular interest and importance. They are represented in the east and north-east by the Cwm Ystwyth Grits and the Talerddig Grits which are slightly younger in age. Many of the lead mines occur in this Silurian region.

One remarkable fact is the absence of calcareous rocks in the area. Not only are there no limestones as such, but except on the sand dunes, calcium carbonate is either entirely absent or of imperceptible amount in the argillaceous and arenaceous rocks. This has controlled, in part, the present-day flora of the area.

STRUCTURE

Folding

The Cambrian rocks crop out in West Merioneth, forming the Harlech Dome. The dome is elongated along a line from Ffestiniog to Barmouth, and the waves of Cardigan Bay have deeply eroded

into its western half. The centre of the dome is occupied by Lower Cambrian rocks (Harlech Grits) but nowhere is the base of the series seen, although we have here the greatest thickness of Cambrian rocks found in Britain. The beds dip radially away from the centre of the dome, the succession passing upwards into the Ordovician Series, which forms a continuous frame around its southern, eastern and northern sides.

In the country to the south, there are two major anticlinal structures, the axes of which follow very closely the two main rivers of the area, and are therefore known as the Teify and Towy Anticlines respectively. Between them is the Central Wales Syncline, the axis of which continues N.N.E. and separates the Harlech Dome from the Berwyn Dome. The latter, and the Towy anticline, lie to the east of the forest area. West of the Teify Anticline is another broad syncline which occupies the greater part of Cardiganshire; its axis follows the coastline between Borth and New Quay very closely.

The structure of the area is further complicated by cross-folding and minor folding. The cross-folding has introduced elements of plunge into the folds, and has brought about the formation of domes and basins. Because of the minor folding the major structures are, in fact, excellent examples of anticlinoria and synclinoria.

Three domes, each considerably less extensive than the Harlech and Berwyn Domes, lie along a cross-fold axis between Aberdovey and Llanidloes. The most important of these is the Plynlimon Dome, which is a northern extension of the Teify Anticline; in its centre, as in other domes, the Upper Bala rocks come to the surface and, in general, form the highest land. The two westerly domes are elongated along a N.N.E. and S.S.W. axis, whereas the Van Dome, west of Llanidloes, approximates more closely to the true definition of a dome.

Faulting

It will be seen from the geological sketch map (page 42) that the area is crossed by numerous faults. Some of these have been the direct cause of important physiographic features, along others are located the metalliferous lodes of North Cardiganshire and West Montgomeryshire, and nearly all are of great academic interest. Two groups only will be dealt with here, viz.: the *tear faults* and '*lode*' *faults;* no mention will be made of the intricate faulting in the Harlech Dome nor the numerous strike and dip faults which have been identified, especially in the slatey rocks.

Tear Faults. In the north, the Tal y Llyn–Bala Fault, and faults associated with it, have produced the deepest and best defined valleys in the district; in fact the only possible course for roads on

N
MERIONETHSHIRE
MOUNTAINS
CARDIGAN
B A Y
MONTGOMERYSHIRE
BARMOUTH
Barmouth Bay
Fairbourne
Llwyngwril
Llangelynin
Llanfihangel-y-Pennant
Tal-y-llyn
Abergynolwyn
Corris
Aberllefenni
Abercaingell
Dol-for
Esgair-gilliog
Llanwrin
Pantperthog
Commins-coch
Rhos-lefain
Llanfendigaid
Tan-lanau Sta.
Aber Dysynni
Bryncrug
Pennarth
Llangelynin
Tyn-y-coed
Brynglas Sta.
Pen-trumgwr
Rhyd-yr-onen
Trum Gelin
TOWYN
Esquan Hall
Corlan
Fraith
Caethle
914
Pennal
Tygarth
MACHYNLLETH
Derwen-las
Dovey Junc. Sta.
Penerhos
Aber-cegir
Cenarth
Aberhosan
ABERDOVEY
Aberdovey Bar
Clan-Dyfi Castle
Ysgubor-y-coed
Pen Careg-gogo
Llecwedd Edion
Glaslyn
Ynys-las Sta.
Llaneynfelyn
Tre-taliesin
Angler's Retreat
Moel y Llyn
Borth
Talybont
Upper Borth
Afon Leri
Llanfihangel-genau'r-glyn
Elerch
Lead Mine
Drosgol
Nant-y-moch
Plynlimon
Pen Plynlimon-Arwystli
Source of River Wye
Esgair Nessman
Drum Peithnant
Llanfihangel
Llanfihangel-genau'r-glyn
Bow Street
Penrhyncoch
Goginan
Comins-coch
Pond Sylfaen
Cwmrheidiol
ABERYSTWYTH
Y Foel
Plant Mab

CARDIGANSHIRE
CAMBRIAN
MYNYDDYNIS
SOUTHERN CAMBRIAN FORESTS
Commission Forests
Other Woodlands
Forest Names
DOVEY
5 0 5 Miles
NEW QUAY
Llanina
Llandysilio
Cross Inn
Llanarth
Neuadd
Oakford
Dihewid
Llwyn Dafydd
Sion Inn
Llangranog
Llanarth
Llanddewi Aberarth Upr
Llanbadarn Trefeglwys
Henfynw Upper
ABERAERON
Aber-Arth
Pennant
Afon
Arth
Nebo
Cross Inn
Blaenpennal
Penuwch
Llanerchaeron
Aeron
Tare-neuadd
Ciliau-Aeron
Brynog
Trefilan
Afon Aeron
Garthcli
Aber-Meurig
Llanfihangel Yatrad
Fetin-fach
Mydroilin
Caled-rhydiau
Temple Bar
Llangybi
Derry Ormond
Silian
Cribyn
Tal-gareg
Core goch
Bettws-Bledrws
Derry Ormond Sta.
Llanfair Clydogau
Cellan
Falcondale
LAMPETER
College
Llanwnen
Pont-Shân
Dre fach
Llanwenog
Llanfyrnach
Castell Howell
Cwrt-newydd
Glyn-Arthen
Capel-Cynon
Bettws-Evan
Rhyd-Lewis
Flostrasol
Troedyrraur
Pen-rhiw-pal
Sarnau
Bryn-Hoffnant
Werfilbrook
Plwmp
Cwm Tydi
Llwyn Dafydd
Llanina
Llangranog
New Quay Bay
NEW QUAY
Llanerchaeron
Aeron
Ciliau-Aeron
Llanbadarn Odwyn
Llangeitho
Nantcwnlle
Capel-Bettws-Lleucu
Pont-Llanio Sta.
TREGARON
Y Drum
Eagair Fraith
Llyn Berwyn
Eagair Amber
Gamallt
Bryn Crwn
Llyn Teifi
Pontrhyd-Pendigaud
Abbey Strata Florida
Strata Florida Sta.
Ysbyty Ystwyth
Ystrad Meurig
Llanafan
Llanfihangel-y-creuddyn
Crosswood Park
Rhostie
Llanddeiniol
Llanfihangel Rhod-Mad
Llanrhystyd Road Sta.
Llanychaiarn
Nant Eos
Pont-lanio
Rhyd-y-felin
Aber-rheidol
Devil's Bridge
Pont-erwyd
Pont-Dihewid
Bryn Garw
Geiliau
Pentre brwngwt
Trawsallt
Mynydd Bach
Bronant
Llanon
Llansantffraid
Llanrhystyd
Trefeinfer
Mabws
Llanwyrryfon
Llwdrod
Careg-li-pw
Cors Goch Glan Teifi
Dyfyn Du
Pen-y-Bwlch
Eagair Llwyd
Eagair Amber
Mon Trum
Bryn Crwn
Llyn Teifi
Afon Teifi
G.W.R.
C.R.

the north and on the south side of Cader Idris is along one or the other of these faults. It may be that the movement along this major structure has differed at different places, for a wide number of varying estimates has been made of it; what appears to be generally agreed upon is that lateral movement (tear) has played an important part, and that the country south of the fault has moved north-eastwards relative to that on the north, while the vertical movement, probably small in comparison, is a downthrow to the north.

Farther south, the Llyfnant Fault is likewise a tear fault. Here the evidence is beyond doubt, for the fault is parallel to the dip of the beds and several well characterised anticlines and synclines and smaller strike faults can be identified on both sides of the main fault; these prove, that whereas the vertical displacement varies between 80 to 618 feet, the horizontal displacement ranges from 1,700 to 3,000 feet to the east on the north side of the fault. It would appear then that the land between the Bala and Tal y Llyn Faults has moved eastwards relative to the rest of the country. The fault forms a straight steep cleft in the hills, three miles long, and it is probable that the straight north side of the estuary for four miles east of Aberdovey indicates a continuation of the fault in that direction.

Lode Faults. These have a general N.N.E.–S.S.W. direction, and from the mineral lodes associated with them large quantities of galena and zinc blende have been mined in the past. The Dylife Fault passes from N.E. to S.W. across the Plynlimon Dome to within five miles of Aberystwyth and has a small downthrow on the north. South of it another fault runs from the Van mines near Llanidloes and crosses the Rheidol gorge between Ponterwyd and Devil's Bridge and extends to Rheidol Falls. It has a small downthrow to the south. The largest is the Ystwyth Fault along which the River Ystwyth flows in an almost straight line for eleven miles in its upper reaches, forming a steep-sided valley. This fault has a downthrow of between 2,500 and 3,000 feet which can be worked out near Pontrhydygroes where the Lower Llandoverian beds come up along the axis of the Teify Anticline, the plunge of which is about 10° S.; the same beds disappear near Parson's Bridge, five miles to the north.

Glaciation

Glaciation, of the Alpine type, affected the area. Some of the higher peaks stood out above the névé and suffered intensive erosion, and the general effect has been to produce the usual glaciation features of cirques, hanging valleys, U-shaped valleys with truncated spurs, moraines and glacial lakes. At lower levels much

boulder clay (containing more boulders than clay) and morainic debris has been left behind. This occurs in the valley bottoms and along the lower slopes of the adjoining hills. Ice radiated from the Cader Idris and Plynlimon centres. The coastal region was also affected by the Irish Sea Ice, and the morainic debris from these glaciers formed low coastal platforms of boulder clay.

The mouths of the rivers flowing westward were dammed by the glacier from Cader Idris as it moved southward down the coast, being held in position there by the Irish Sea Ice. Marginal lakes were formed along the coast and the water from these overflowed southwards producing valleys (overflow channels) parallel to the coast. These southward facing valleys, many of them without rivers, are a marked feature of the Cardigan coastal area. The Tregaron Bog and other areas of bad natural drainage owe their condition to morainic and other obstructions of glacial origin, while much of the peat-covered plateau country is underlain by impervious boulder clay.

There is evidence along the coast of Cardigan Bay of both uplift and subsidence in geologically recent times. The former is indicated by the Coastal Plateau previously mentioned; while the evidence of subsidence is seen in the submerged estuaries, the submerged forests, and the sarns, Sarn Badrig, Sarn Y Bwch and Sarn Cynfelyn. The uplift was pre-glacial and the subsidence post-glacial. The latter accounts for the thick deposits of boulder clay and alluvium in the estuaries of the Mawddach, Dovey, Rheidol and Ystwyth which have been proved to be greater than 100 feet in each case. Submerged forests, rooted in thick impervious clay, may be seen at low tides at Clarach, Borth and Barmouth. The sarns of Cardigan Bay are embankments of boulders running out from the coast in a W.S.W. direction. They occur between the main estuaries and are probably the remains of the boulder-clay watersheds which separated the main river systems, when the latter extended farther out than at present and before coastal erosion removed the greater part of the glacial platform. They are particularly noteworthy in that similar banks have not been recorded elsewhere in the world

A faint glow of colour, and the bud is on the heather;
Best of all the wild flowers and last flower of all;
Stretching up the hillsides mile and mile together,
Creeping to the burn-edge, flooding to the wall;
Lanes of buds that beckon to the lingering black-faces,
Cover for the curlews, pasture for the bees;
Soon in all their glory shall blaze the mountain places,
Soon we'll walk the moorland in purple to our knees.

Will H. Ogilvie

PLANT LIFE

BY PROFESSOR LILY NEWTON

Though some tracts of the Cambrian Forests still carry a natural vegetation, the greater part shows the influence of human occupation. A few small grey towns fit into the landscape, cultivated land surrounds little homesteads in the valleys, and many of the woodlands have been planted at various times, though others have been destroyed. Leland, writing of the Strata Florida area, states that 'Many hilles therabout hath bene well woddit, as evidently by old rotes apperith, but now in them is almost no woode: the causses be these. First, the wood cut down was never copisid, and this hath beene a great cause of destruction of wood thorough Wales. Secondly, after cutting down of wooddys the gottys hath so bytten the young spring that it never grew but lyke shrubbes. Thirddely, men for the monys destroied the great woddis that thei shuld not harborow theves'.

On much of the higher ground, burning and sheep grazing materially affect the vegetation. Slate quarrying and mining for lead and zinc have left scars in places which are clothed with plants only sparsely, if at all.

From the botanical point of view, the conspicuous feature of the natural soil is the paucity or absence of lime. Though some of the coast is bordered by a belt of shelly blown sand and alluvium, the rocks underlying the surface soil are mostly acidic. They belong to early geological formations with contemporaneous and intrusive rocks in the Cader Idris district and further north. The main peak of Cader Idris rises to 2,927 feet and the vegetation exhibits features of great interest, which can be correlated with the geology.

Seven main rivers dissect the area, and all except the Severn and the Wye flow to the sea in a westerly direction, the Mawddach eroding valleys in the Cambrian and intrusive rocks, while the Dovey, Rheidol, Ystwyth, Aeron, and the upper reaches of the Teify flow mainly across Silurian strata. The Severn, the Wye, and the Rheidol rise in the high ground of Plynlimon, whose triple crown reaches 2,468 feet, the Severn going north into Shropshire before turning south into its main valley. These physiographical and geological features exert a considerable influence on the vegetation and, particularly south of the Dovey, the distribution of the main vegetational types follows the contours.

A striking feature of the area, which will be immediately apparent to the visitor, is the broad expanse of changing colour which the major plant associations exhibit from 'Spring's gay resurrection' until 'beeches strip in storms for winter and stain the winds with leaves'. In the mixed woodland, the delicate greens and golds of oak, birch, and beech pattern the valley sides in early spring often with a double snowdrop (*Galanthus nivalis*), bluebell (*Endymion nonscriptus*) or primrose (*Primula vulgaris*) carpet, while the vivid green of the larches (*Larix decidua* and *L. leptolepis*) in the newer forests, is picked out against the dark background of the evergreen conifers. The pristine beauty of the snowdrops recalls a passage from the well-known Welsh hymn by Cynan:

EIRLYSIAU

Ond Grym yr Atgyfodiad
A gerddai hyd y wlad

Oblegid pan ddeffroais
Ac agor heddiw'r drws
Fel ganwaith yn fy hiraeth,
Wele'r eirlysiau tlws

'Oll yn eu gynau gwynion
Ac ar eu newydd wedd
Yn debyg idd eu Harglwydd
Yn dod i'r lan o'r bedd'.

This has been translated by A. G. Prys Jones as:

SNOWDROPS

But spring's gay resurrection
Stirred all the country-side.
For when I woke at daybreak
And looked towards the moor,
Behold, a thousand snowdrops
Were crowding at my door . . .
'All in their gleaming raiment,
White as the crested wave,
And glorious like their Master
New-risen from the grave'.

Later, masses of golden gorse, which a Welsh poet has called a 'fabric of Arabia's gold, bright, golden tissue', border the margins of the high plateau, and in summer, foxgloves (*Digitalis purpurea*) bloom profusely, while ling (*Calluna vulgaris*) and the purple heathers (*Erica cinerea* and *E. tetralix*) add their quota of colour to the peaty moorland and the bogs. In some high places the colour is enhanced still further by the small, late-flowering gorse (*Ulex gallii*) which mingles with the heather and recalls parts of north Brittany. Much of the extensive sheep walks is clothed with the grey-green mat grass (*Nardus stricta*) or with tufted purple moor grass (*Molinia caerulea*), in both of which clumps of rushes (*Juncus effusus*) mark the wet places, while great stretches of bracken (*Pteridium aquilinum*) change from green to russet as the season advances. Finally, in autumn, the woods are aflame, particularly where cherry (*Prunus avium*) and rowan (*Sorbus aucuparia*) make a brilliant pattern among the oak and other deciduous trees, while the ash (*Fraxinus excelsior*) in a good season looks like liquid gold against a blue sky.

The coniferous forests have less to contribute to the autumn colour, except for the gold of the larch, but in some regions, as, for example, near Pontrhydygroes, Corris and Gelligemlyn, American red oak (*Quercus borealis*) and sometimes tulip tree (*Liriodendron tulipifera*) provide a brilliant border to the dark carpet, the whole often laid among the russet of the dying bracken.

Having looked at the seasonable picture in broad outline, attention can be given to some of the main features of particular vegetational communities which occur within the area, some of which form parts of Nature Reserves under the Nature Conservancy.

Wild Daffodils

INTERTIDAL REGIONS

The sandy bays carry little vegetation, though salt marshes of considerable interest occur near the river mouths, those of the Dovey, for example, having extensive stretches of glasswort (*Salicornia* spp.), sea meadow grass (*Glyceria maritima*,) thrift (*Armeria maritima*) which clothes the upper marsh with a pink sheen in summer, fescue grass (*Festuca rubra*) and sea rush (*Juncus maritimus*). In the Dovey and to some extent elsewhere, colonies of the rice grass (*Spartina townsendii*) occur. A continuous meadow of this tall coarse grass is fixing the mud on the south side of the Dovey, where it can be seen clearly from the railway. Seaweeds occur on the rocky coasts, and at Aberystwyth there is a particularly good sequence of brown algae characteristic of the North Atlantic flora. At Aberystwyth, Llangranog, and Monk's Cave, one can say with Alfred Noyes, who once lived in Aberystwyth, that 'here on this ebb-tide shore each rock pool forms a jewelled bath of beauty, sparkling still' and much interest awaits those who seek it. At low tide the remains of submerged forests may still be seen in several locations, particularly at Borth and Ynyslas. Trees excavated off Barmouth were mainly birch, but the larger stools near Borth were of pine. At the extreme north of the area, in the estuary of a small river, the Artro, on the Mochras marshes, the mingling of the marine algae with the grasses may be seen, and patches of a red seaweed (*Bostrychia scorpioides*) lifts cushions of turf above the general level of the sward.

Wild and lonely regions such as this remind one of the Welsh verse by Eifion Wyn:

PE BAI GENNYF SERCH

Rhwng llwyni y brwyn a gwymon gorffenna',
A'th wallt yn y gwynt;
Mae celyn y mor yn holi amdanat,
Pan elwyf fy hun.

This has been translated by Sir H. Idris Bell as:

A LOVE SONG

Past the sedgy banks and the weed-strewn reaches
To the windy shore.
The pale sea-holly is sick for thy coming
When I come alone.

COASTAL STRIP

Sand dunes flank the coastal sandy stretches on the landward side, and shingle beaches are sometimes present, as at Borth, where the town stands on a storm beach. Characteristic plants of the seaward dunes are the marram grass (*Ammophila arenaria*) and sea sedge (*Carex arenaria*) but the landward and more stable dunes have a richer flora, and burnet rose (*Rosa spinossissima*), sea spurges (*Euphorbia paralias* and *E. portlandica*), and hound's tongue (*Cynoglossum officinale*) occur frequently, often with a carpet of smaller flowering plants. The dunes at Mochras and further north at Harlech, together with adjacent damp sandy areas which are calcareous, carry a very varied flora. The bryophyte flora—mosses and liverworts—is rich, orchids are frequent, horsetail (*Equisetum palustre*) occurs, ragged Robin (*Lychnis flos-cuculi*) forms spreading masses of deep pink, species of St. John's wort (*Hypericum*) and *Viola* may be found, together with a wealth of other flowering plants. In the swamps a rich marsh flora occurs. On the shingle beaches sea holly (*Eryngium maritimum*), sea sandwort (*Honkenya peploides*), yellow horned poppy (*Glaucium flavum*) and the alien, but well-established, tea tree (*Lycium chinense*) bloom freely. A conspicuous plant of the shingle and the cliffs is the sea campion (*Silene maritima*) which often clothes large areas with masses of white flowers and silvery green foliage. In the extreme south, the spring squill (*Scilla verna*) blooms on the sward on the top of the cliffs.

BOGS

At Borth, a little above sea-level, and at Tregaron some 500 feet higher, extensive bogs occur which exhibit vegetational features of great interest. There seems little doubt that the peat of Borth bog

The pattern of hills and water-worn vales in the Dovey Valley country; an aerial view north over Dovey plantations from Aberangell towards Blaen y Cwm

The Rheidol Gorge, cut deeply into the hills above Devil's Bridge, as viewed from the air

Welsh Poppies

is continuous with that which is now beneath the sea, its subsidence being recorded in the Cantref y Gwaelod legend. It may be that the pines (*Pinus sylvestris*) on the island in the centre of the bog are a relic of the flora of the submerged forest. Tregaron bog, on the other hand, marks the site of a former glacial lake and is now traversed by the slow meanders of the upper waters of the river Teify. The floras of the bogs are similar, though Tregaron, which is much the larger, is floristically richer.

Both are regarded as raised bogs, and Tregaron is probably the best and least disturbed actively growing raised bog in Wales. It is a Nature Reserve and is some 1,500 acres in extent. The bog is formed of three lens-shaped accumulations of acid *Sphagnum* peat, and as the river winds through, it loses its pollution of heavy metals obtained from the washings of old lead mines and emerges as a salmon river.

Borth bog, in spite of its low-lying position, has great charm for the botanist, particularly when a soft west wind carries the fragrance of the bog myrtle (*Myrica gale*) and when the 'changing burnish heaves' on the reeds which form a dense marginal association.

MINES AND QUARRIES

The hinterland of the upper reaches of the valleys of the Rheidol and the Ystwyth are dotted with old workings where lead and zinc were mined spasmodically from Roman times to the nineteenth century. The toxicity of these metals to vegetation is well known, and the uncolonised areas indicate only too clearly the serious effects of the metals on vegetation. The Rheidol was seriously

polluted twenty-five years ago, but care and the gradual leaching out of the metals in the dumps of spoil after oxidation, has led to a cleansing of the river, which now has abundant fish life. Little vegetation occurs on these old mine workings, though sometimes sheep's bit (*Jasione montana*) and, near the coast, sea campion (*Silene maritima*) establish themselves. *Thlaspi arvense*, which is tolerant of lead and zinc, could be found on the river shingles even when little else occured. As the river recovers, so the vegetation on the banks and in the quiet reaches increases. In the Corris region the remains of extensive slate quarries can be seen, and though the large heaps of spoil are mostly bare and unsightly, there has been some colonisation by birch (*Betula pubescens* and *B. pendula*). Near Dolgellau there has been some colonization of old gold and copper mines. Thrift (*Armeria maritima*) is a conspicuous plant and its presence is of especial interest in a region so far removed from its normal enviroment near the coast.

WOODLANDS

The woodlands of the area are set in a varied vegetational pattern and they occur at different heights above sea level, though they tend to clothe the valley sides. Some of them are the remains of more extensive deciduous woodlands, either natural or planted many years ago, others which are in various stages of development belong to more recent times, having been planted by the Forestry Commission or by landowners. These new woods are described in another chapter and only brief references to their ground flora will be made here, though observations made periodically in one wood should perhaps be recorded. When land is newly planted, the original ground flora, which remains, changes rapidly with the effects of draining, planting, and the exclusion of sheep. The ground flora of a recently planted wood diminishes with age, and with the increasingly dense cover which the trees provide, until, in most coniferous woods, a stage is reached when only a few straggling seedlings exist among the mosses which wholly or partially cover the surface of the ground. In the next stage the ground beneath the tree canopy is almost bare save for leaf litter, but later still after the trees have been thinned out, the light available at ground level increases, and a new ground flora establishes itself.

Observations which illustrate some of these points have been made in the Artist's Valley (Cwm Einion) which carries a tributary stream into the Dovey. The site of a new plantation of some eleven acres, between 800 and 1,000 feet above sea level, was surveyed soon after its enclosure in 1939, and the main vegetational changes have been surveyed on four subsequent occasions. The trees planted

were mainly Norway and Sitka spruces, with a small plantation of larch. Before planting took place, acid grassland consisting of purple moor grass (*Molinia caerulea*), sheep's fescue (*Festuca ovina*) and wavy hair grass (*Deschampsia flexuosa*) was present in the lower part of the valley. There were also considerable patches of rushes (*Juncus effusus* and *J. articulatus*) in the wet places. Above these communities a belt of bracken traversed the area as far up as a transverse leat. The bracken only crossed the leat at two points where the soil was deeper. On the steep slope where the soil was thin and grazing difficult, there was a belt of ling (*Calluna vulgaris*), whortleberry (*Vaccinium myrtillus*) and gorse (*Ulex gallii*). Above the 1,000 foot contour the cover was mainly purple moor grass. At the end of two years, planting and draining had been completed, sheep were excluded, and an increase in ling and the finer grasses was evident. Four years later there was a considerable increase in gorse and as much as 20 per cent. increase in the finer grasses. Some seedlings of hawthorn (*Crataegus monogyna*) and rowan (*Sorbus aucuparia*) had become established, and the moss and lichen carpet among the grasses had increased. In addition, there was a reduction in the rushes. By 1950-51 the increase in purple moor grass at the summit, and the decrease in the *Juncus* below the leat, were both obvious; but much of the ground flora under the trees had been eliminated, except for tall and spindly bracken in lighter spots.

These changes are clearly consequent upon drainage, the natural competition among the plants due to the elimination of sheep, and the effect of the increasingly dense tree canopy. So far, thinning has not taken place.

Among the older deciduous woodlands, some are the remains of old natural forests, in which, on the siliceous soils of the Silurian, the dominant tree was the sessile oak (*Quercus petraea*). There is evidence, however, that in earlier times the present sheep walk was birch-clad and old stools of birch may still be found, as, for example, on the south side of Llyn Berwyn, near Tregaron, at 1,400 feet elevation. The present absence of birch in most of the higher localities may be due to a change of climate or to intense deforestation. Some birch, however, still remains, as on the slopes of the upper *ffridd* of Cader Idris where, between 800 and 1,100 feet, a wood and individual hybrid birch trees on adjacent land, continue to flourish. Most of the birch woods (*Betula pendula* and *B. pubescens*) which now exist form a narrow localised zone at the upper limit of the sessile oak woods. The canopy is light and the ground flora passes into grassland and ultimately into mat grass moor. The amount of birch which can establish itself is probably largely dependent on the intensity of grazing. The presence of the birch therefore may

represent a stage in the development of natural oak wood.

Considerable areas on the valley sides are still clothed with sessile oak woods, in some of which the Welsh poppy (*Meconopsis cambrica*) and filmy ferns (*Hymenophyllum* spp.) occur; some of these woods are probably planted, but others appear to be the remains of natural woodland. Examples of the latter may be seen on the lower slopes of Cader Idris near Tal y Llyn, at Maentwrog, and at Coed y Rhygen near Trawsfynydd. There is a good deal of hazel (*Corylus avellana*) in the undergrowth, a little birch is present and the ground flora is dominated by mosses and other bryophytes, though wavy hair grass (*Deschampsia flexuosa*), common bent grass (*Agrostis tenuis*) and heath bedstraw (*Galium hercynicum* (*saxatile*)) are frequent. Some of the planted sessile oak woods in the area extend into the lower parts of the valleys, and at the lower limit the flora is much richer. An excellent example occurs in the valley of the Aeron, where there is a succession of spring flowers, and dog's mercury (*Mercurialis perennis*), ramsons (*Allium ursinum*), golden saxifrage (*Chrysosplenium oppositifolium*), bluebells and primroses form a carpet. These woods are floristically among the richest parts of the whole area and several species of orchid occur in them, as well as daffodils (*Narcissus pseudonarcissus*), which appear to be native. Perhaps one of the most striking features of the whole region is the mixture of bluebells with red campion (*Melandrium rubrum*) in the spring. In a good season this is a very impressive sight, particularly when the oaks themselves add a contrasting colour with their opening buds. Where a little beech (*Fagus sylvatica*) is mixed with the oak, the spring beauty is still further enhanced, as it is north of Dolgellau. In woodland clearings and on the margins, foxgloves bloom profusely.

There are some ash-woods on the coastal plateau, as for example, along the slopes of the Rheidol valley near Capel Bangor. These often contain some sycamore (*Acer pseudoplatanus*) and beech, and the ground flora is varied. It is often dominated by male fern (*Dryopteris felix-mas*), bracken, broad buckler fern (*D. austriaca*), blackberry (*Rubus* spp.), bluebell and rush (*Juncus effusus*).

Some birch-ash woods occur in the moister areas, particularly on the coastal plateau, but they have probably arisen as a result of felling other trees. Alder (*Alnus glutinosa*) and ash woods also occur in moister places and, as the canopy is not usually very dense, nor the trees very closely packed, a shrub layer as well as a ground cover is often present, as is well seen in the Llyfnant Valley.

Ash alone rarely forms communities of any size, but on the lower slopes of Craig y Benglog, north of Cader Idris, an upland ashwood of rather more than 13 acres occurs between 900 and 1,250 feet. It is developed partly on scree and partly on a rocky slope, and appears

to be of recent origin, having perhaps seeded from ash trees which were present in an oakwood, now demolished, which occurred farther down the slope. This little ash wood is open and the ground vegetation is rich, the influence of the lime being evident in the presence of the rock-rose (*Helianthemum chamaecistus*) and marjoram (*Origanum vulgare*) amongst other calcicole plants. Price Evans has pointed out that this may be due to a number of factors, including the presence of calciferous rocks, together with pockets of acid soil, the open character of the woodlands, and the great diversity of the screes. The wood is situated at the upper limit of the tree growth, winter snow can be severe, wild goats cause considerable damage, and the hazel from the lower parts of the wood is cut for fencing.

Willow (*Salix* spp.) thickets occur in moist places on the lower slopes of some of the valleys and along the stream sides. There is some lime (*Tilia cordata*) in moist places, as in the Llyfnant Valley, and in spring the rhododendrons (*Rhododendron ponticum*) which have been planted on many slopes add masses of purple to the shimmering blue of the bluebells.

MOORLAND AND HILL PASTURE

Above the tree limit, which is about 1,200 feet, except in regions of recent afforestation, large tracts of the country are covered with dwarf herbage which forms the range of sheep walks for which Wales is famous. In the open sheep walk, even within the tree limit, the sheep eat any seedling tree which tries to establish itself, so that only an inaccessible soil pocket is colonised by a stray birch or rowan seedling. In the upper north-western part of the area large tracts of heather occur, among which the hard fern (*Blechnum spicant*) is a conspicuous feature. The scenery in this area is some of the finest in Wales, especially when the purple colour of the heather is at its brightest in September. On the sheep walk, in addition to the mat grass and the purple moor grass, sheep's fescue (*Festuca ovina*) occurs, and patches of the heath rush (*Juncus squarrosus*) mark the wetter peaty places. In addition, considerable patches of the common rush (*Juncus communis*) occur in the flushes. In many areas traces of earlier birch forests occur, and places which the sheep cannot reach to graze closely tend to develop into heather moor. The altitudinal succession of the heaths is noteworthy; the bell heather (*Erica cinerea*) dies out first, the cross-leaved heath (*E. tetralix*) extends higher and the ling (*Calluna vulgaris*) reaches as far as the summit of Plynlimon (2,468 feet). At the points where tributary streams from the hanging valleys joints the main valley floors, and also in other wet peaty places over the whole area, patches of *Sphagnum* moss hold the moisture, and the insectivorous

butterwort (*Pinguicula vulgaris*), sundews (*Drosera* spp.) and the lovely little bog asphodel (*Narthecium ossifragum*) flourish and bloom in July. These little communities are particularly well seen on the slopes of Plynlimon and Cader Idris. On some of the hillsides the club mosses (*Lycopodium* spp.) occur, and in the summer the mountain pansy (*Viola lutea*) is scattered over large areas, its flowers varying from deep purple to sulphur yellow. In full summer, patches of the blue harebell (*Campanula rotundifolia*) add their charms to the roadsides, particularly on the higher ground. It was of this region that George Borrow wrote in his *Wild Wales*:

'PLYNLYMON

> What, however, has more than anything else contributed to the celebrity of the hill is the circumstance of its giving birth to three rivers. The first of which, the Severn, is the principal stream in Britain; the second, the Wye, the most lovely river, probably, which the world can boast of; and the third, the Rheidol, entitled to high honour from its boldness and impetuosity, and the remarkable banks between which it flows in its very short course, for there are scarcely twenty miles between the ffynnon or source of the Rheidol and the aber or place where it disembogues itself into the sea'.

CADER IDRIS AREA

Geologically, the rocks of the Cader Idris region resemble those of Snowdonia, though topographically the area is a separate unit. It lies between the valleys of the Wnion and Dovey and is cut almost in half by the Tal y Llyn Valley with its beautiful lake. It is bounded on the west by the sea, is exposed to the strong westerly winds, and has a high rainfall which probably reaches its maximum on the leeside of the highest points where the mountain lakes, Llyn Cau, Llyn y Gader and Llyn Aran are situated. The mountain lakes were described by Gwilym Cowlyd (1827-1905) in a Welsh *englyn*:

> 'Y llynnau gwyrddion llonydd—a gysgant
> Mewn gwasgod o fynydd;
> A thynn heulwen ysblennydd
> Ar len y dŵr lun y dydd'.

This may be translated as follows:

> 'The calm green lakes are sleeping in the mountain shadow, and on the water's canvas bright sunshine paints the picture of the day'.

The topography is very varied and includes sheltered valleys, open moorland and craggy heights on which the vegetation varies

markedly with the underlying rock. The vegetation of Cader Idris has been described by W. Price Evans, whose knowledge of its flora is unrivalled. The lower slopes consist of arable land, meadows and associated pastures, together with plantations and the remains of earlier woodlands. In the lower woods of the valleys, the pedunculate oak (*Quercus robur*) is dominant, but it gives place with altitude to sessile oak (*Q. petraea*) and then, at higher altitude, to hybrid birch (*Betula pendula x pubescens*). Bluebells shimmer beneath the trees of the lower woods in spring. Some of the meadows are on peaty land and much of the hill pasture is dominated by mat grass and purple moor grass though other grasses attain local dominance, together with bracken and the small gorse.

The moorland zone which occurs higher up the mountainside is clothed in places with ling though the scarp slope is too rocky for the development of a typical heather moor. On the plateau there are many small sphagnum bogs in which cotton grass (*Eriophorum* spp.) waves its silver tassels, and wet communities border the small pools. On the higher grassy moor, mat grass is generally dominant. As in other parts of Merioneth and Cardiganshire, old stools of birch and willow occur near the base of the peat at elevations of well over 1,000 feet.

Peregrine Falcon

Gwyn eu byd yr adar gwylltion,
Hwy gant fynd i'r fan a fynnon.

Blessed are the wild birds,
For they can fly whithersoever they choose.

MAMMALS, BIRDS, REPTILES, AMPHIBIANS AND FISH

BY WILLIAM CONDRY

From the naturalist's point of view one of the most delightful qualities of the face of Wales is the diversity of natural habitats it offers not only by the wide variety of its soils, ranging from calcareous to very acid, but also by its mountainousness. And even within this Cambrian Forest region, a district of predominantly acid soils in which variety is comparatively lacking, there is a wealth of different types of country to explore. The 50 miles of coastline include sands, stony beaches, shingles, dunes and cliffs with their many zones of diverse creatures. There are coastal marshes, large and small, saline and fresh, basic and acid. Behind the coast there are rivers and estuaries; farmlands, parklands and woodlands. Then, abruptly in Merioneth, more gently in Cardiganshire, we are into the mountains, a very mixed region of rocky heather-grown summits, grassy moorlands, peat bogs, natural lakes and reservoirs, fast torrents and waterfalls, wide high valleys and narrow gorges, gorsy hillsides, steep woods of oak and birch, and all the other varied haunts

available to wild life which lie in that sparsely inhabited, elevated country that stretches from the Rhinogs and Aran Fawddwy south to Mynydd Bach, Tregaron Bog and the wide moorlands west of the upper Wye.

This is a reach of country in which a great deal remains to be discovered by naturalists. Its birds have been comparatively well studied, though about even their distribution there are gaps in what is known, and observation of their habits can of course never be exhausted; besides, their populations are always fluctuating, always offering opportunities for new surveys. The mammals, reptiles and other creatures, so much less easy than birds to observe, are very much less known. In mountain country their altitudinal range is of great interest and anyone could add to what we know of local animals by finding out how high they can be found and in what sort of habitats. Just as the chief scenic delight of these forests are their continuous backcloth of mountains, so for the naturalist the wild life of the upland valleys, high woods, screes and mountain tops is a perpetual allurement.

MAMMALS

Beginning with the mammals, we have all five of the common insectivora; hedgehog, common shrew, pigmy shrew, water shrew and mole. But the ecology and distribution of some of them in this region are imperfectly known. The hedgehog is common throughout the lowlands—its corpses along the main roads in summer tell how common—and is found in the hills to as high as deciduous woodland reaches, that is to about 1,000 feet. Corpses of hedgehogs sometimes found on the high moors have presumably been carried there by predators, though it is possible that the hedgehog may now have invaded the mountain region in the wake of the forestry plantations. Both common and pigmy shrew can tolerate mountain conditions; the common has been seen at 2,900 feet on Cader Idris and the pigmy has been recorded high up on Aran Fawddwy. Even the water shrew, usually regarded as a lowland species, is found up to at least 1,000 feet. The mole, of which yellowish-white specimens are not infrequently recorded, is abundant in reasonably dry soils to over 2,000 feet.

Our ignorance of this region's bats reflects both a general lack of interest in bats and the difficulty of observing them. Species recorded are: pipistrelle, noctule, Daubenton's, whiskered, Natterer's, long-eared and greater and lesser horseshoe; in other words the eight most widely distributed British species. One cannot help thinking that others await discovery. In any case the distribution and numbers of the eight recorded are most imperfectly known. Here

Polecat,

then is a challenge to the amateur field naturalist. Surely in the many old mine-workings and disused quarries of the area, not to mention the hollow trees, church towers, house roofs, rock crevices and so on, there are many discoveries to be made, not only concerning the distribution but also of the very intriguing habits and migrations of the local bats.

Of the rabbit it is difficult to say anything that will not be out of date almost immediately, so rapidly is its status changing. As I write this (spring 1959) the signs are that the rabbit, recovering from the near annihilation inflicted by myxomatosis in 1954-5, looks like coming back despite official determination to wipe it out. The rabbit was formerly widespread in suitable country up to about 1,000 feet, with local colonies reaching 1,300 feet. It is in its remoter haunts, the rocky, scrub-covered hillsides and boulder-screes, where in many places the disease never appeared, that the rabbit looks most safely entrenched.

The brown hare, though in few places abundant, is widespread from the coastal marshes and dunes up to about 1,000 feet, above which it thins rapidly except where it finds shelter in the deep vegetation which springs up in new forestry plantations. It has a long breeding season: in fact you may find young hares in almost any month. Its numbers have increased in Wales since myxomatosis

reduced the rabbit stocks. The mountain hare, though long introduced in Snowdonia, is not found here, apart from the single record of one seen recently on Aran Fawddwy. A few said to have been liberated in the Plynlimon area early this century failed to get established.

The numbers of small rodents are phenomenal, though since many are nocturnal the immensity of their populations is seldom realised except by gardeners, farmers and foresters who see the damage they do to crops and trees. Great must be the importance of these multitudes of small creatures as a depressing factor on the regeneration of plants and trees, and also as food for predatory animals and birds.

Both bank and field voles are abundant in the lowlands and semi-uplands, but the field vole is much the commoner in the mountain region. Both are subject to periodic increases which may reach plague proportions, especially in the sheltered, undisturbed conditions they find in new forestry plantations, where they may kill numbers of trees by gnawing off their bark when other supplies of food have failed. Compared with these two, water voles are few and local and may be confined to waterside habitats in the lowlands. The longtailed fieldmouse, also called woodmouse, is exceedingly abundant in woods, fields, gardens and plantations, but does not seem to range as high as the field vole and does not undergo comparable fluctuations in numbers. The status of the closely related yellow-necked mouse awaits investigation: it is known to be common locally, but how common and how local and whether its habitat preferences or altitudinal range differ markedly from that of the woodmouse, are all alike unknown.

House mice and brown rats, closely linked as they usually are with houses and farms, must be far less common than field mice and voles in a region so predominantly mountainous and uninhabited. An interesting question relating to rats and house mice is how long they can lead lives quite away from man-provided food supplies. The dormouse is not uncommon in wooded or bushy places in the lowlands, but is yet another species whose altitudinal range seems to be unrecorded. Whether it is purely a lowland animal or has invaded the high forests is a question not easily answered about such a creature of the night, which is hibernatory also. Incidentally the dormouse is not so strictly nocturnal as some authorities say, nor so thoroughly a winter-sleeper. For here it can sometimes be seen feeding in hedges and bushes in the middle of the day and can occasionally be found active in a mild winter.

The red squirrel is still found in most types of deciduous woodland as high as such woodland extends and, as might be expected, has taken kindly to many of the new conifer forests. But it is a fluctuating

species and at present appears to be losing ground in some localities, a state of affairs to be borne in mind in view of the always impending invasion of the grey squirrel which, if it does establish itself in such localities, will undoubtedly be widely blamed for 'driving out' the red squirrel from them. Grey squirrels began to invade from the east a few years ago and individuals reached Montgomeryshire in 1947 and the west coast forests by 1955. Despite every effort to keep them down they are still being recorded in widely scattered localities, though no general occupation of the region has yet taken place.

Carnivorous mammals in the main have increased this century as the result of a great decrease in game-keeping, and the growing realisation that many species do less harm to man's interests than used to be thought. The badger provides the most striking example of this increase, and in half a century has changed from rarish to abundant throughout the lowlands and semi-uplands. But the badger does not haunt the mountains as the fox so commonly does. This region has always been great fox country and there seems to be a possibility that zoologists will one day concede what Welsh countrymen have long asserted: that our foxes are of two kinds, the grey mountain fox and the red lowland fox. At present foxes and cubs are being destroyed annually in large numbers, and it seems unlikely that even so resourceful a species as this will be able to undergo such great persecution without a considerable decrease in its population.

Otters remain fairly common despite persecution by fishing interests. Though most numerous on lowland rivers, estuaries and coasts, they are occasionally met with on their wanderings upstream as far as the moorland region. These and other carnivores, more active by night than day, are more likely to be seen dead than alive. So it is with the pine marten, which still holds on in parts of this region and may be increasing slowly in the fastnesses of the new forests. But if it were not for the occasional one unintentionally taken in fox-traps the marten would be considered very rare indeed. That it has been recorded close to an estuary, in an upland forest and on a mountain top at nearly 2,500 feet above sea level, demonstrates the wide range of habitats the marten can thrive in. The marten's cousins fare better: stoats are frequent in the lowlands and have been recorded in the screes and cairns of the mountains; weasels are common at least in the lowlands where they are occasionally caught in mole-traps, but being smaller and more nocturnal than stoats they seem much scarcer. Polecats are more numerous in this Forest Park than in any other part of Britain, and are recorded from the coast to the high moorland forests. A reddish variety, strikingly different from the normal black polecat, began to be

recorded about 1900 and is still present. It first appeared in North Cardiganshire and eventually spread to South Merioneth.

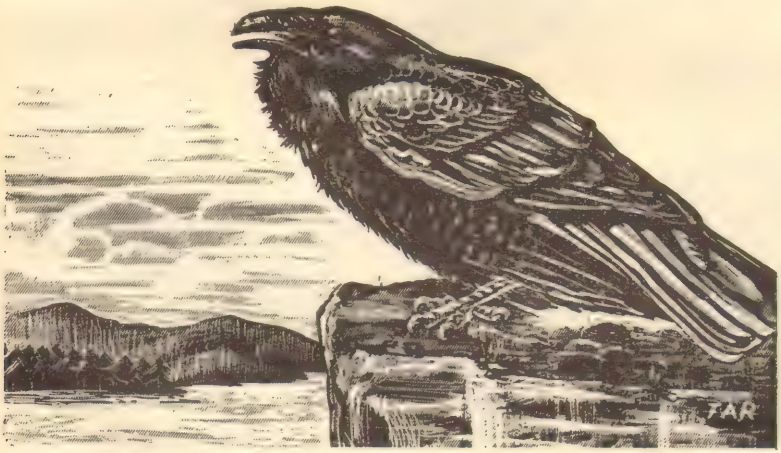
Of seals, only the grey is on record as breeding on this stretch of coast. As it is a haunter of rocky waters its few breeding places are along the cliffs of Cardiganshire, where it is not far from its headquarters which lie farther south still in Pembrokeshire.

Wild deer are lacking in the area, the few occasionally seen being presumably escapes, but the deer park at Nannau, near Dolgellau, has long held fallow deer. There are several fine herds of feral goats on the Merioneth mountains, descendants of forbears which took to the wild centuries ago. With their great curving horns, shaggy coats and timid behaviour they seem, especially when standing along a rocky skyline, as genuinely wild as the ibex of the mountains of Europe.

BIRDS

Bird species being so much more numerous than four-footed animals it would be impossible in the space available to mention all that might be observed round the year. What follows therefore is an outline of some aspects of the distribution of breeding birds within these forests.

The countless acres of sheep-nibbled grassland that clothe most of the mountains above about 800 feet, providing little in the way of cover and food, attract but few species of birds. Skylarks love this grassland and glorious is their chorused singing all over the hills in spring and summer. Great too is the number of meadow pipits whose chocolate coloured eggs are so well hidden under the tussocks



Raven

and whose falling songs tinkle on every hand as the males glide earthwards. Especially near walls and rocks under which they can nest, wheatears too haunt these open grasslands where the turf is short. But they have been rather less common about the hills the last few seasons. These three apart, only the golden plover is a true grassland nester here and a scarce one too, for many miles lie between its isolated, scattered little colonies, so that you can easily have a long walk across the moors in spring yet not hear nor see a sign of golden plovers. Only the cuckoo can be added to this brief list of grassland species for it lays its eggs in pipits' nests round the fringe of the moorland region: but it can seldom be heard above about 1,500 feet.

But if pure hill-pasture has such a thin variety of birds an immediate increase of species becomes noticeable if certain other features are added to vary the scene, especially in the less elevated parts of the uplands. For instance a single isolated thorn, rowan or conifer may contain the nest of chaffinch, magpie, crow or sometimes even of raven or buzzard, or may be a singing-post for the only tree-pipit in miles. Of course a whole line or group of trees, such as exist on the moors here and there as shelterbelts, may attract quite a community of birds besides these, the most likely being wood pigeon and goldcrest, while nesting in the old crows' nests may be kestrels, long-eared owls and tawny owls. The long-eared owl is very local, however.

Buzzard

Short-eared Owl

Let there be an old building on a moor or at the head of a valley, the ruin of some long-abandoned mine or a decaying farmstead, especially if accompanied by a few old hedges or trees with their wealth of insect life, and there will be quite a variety of birds. Ravens may nest on a high old wall; pied and grey wagtails love its lower crevices; or there may be wheatears, redstarts, wrens, kestrels, stock doves or jackdaws. House martins still return to nest under the eaves of deserted dwellings and a few of these empty moorland houses have barn owls above their bedroom ceilings. In seasons of abundance spotted flycatchers also haunt the upland ruins.

Where the grassland is replaced by extensive beds of rushes there may be curlew, snipe, lapwing (particularly on high ground) and reed buntings. Whinchats are very attracted to these rushy tracts if given a fence or isolated bushes on which the males can sing. The rarest of all the high moorland-marsh breeding species is the short-eared owl.

Two other types of hillside vegetation, though very abundant, are not rich in birds. Bracken, densely covering enormous areas, is poor in insect life and too unstable to support nests, so that although yellow hammers, tree pipits and occasionally whinchats breed under its canopy, it normally attracts few species. Gorse gives us one delightful bird: the linnet, which breeds in scattered colonies as far up the mountainside as suitably bushy furze extends.

This is a region of comparatively little heather, the best stretch probably being that in the north on the rocky terraces of the

Redpoll

Rhinogs. Wherever there is heather there will be skylarks and pipits in abundance, but the same unhappily cannot be said of that little falcon of the moors, the merlin, which has been declining for many years now and is becoming rather rare. Merlins persist, however, in very small numbers even in non-heathery areas, where they nest in old nests of crow or magpie in upland thorns or rowans or on rocky gorge-sides. The only other typical heather-bird, the red grouse, though sparse compared with its numbers of fifty years ago, is still very widespread in suitable country.

Just as variety is added to the mountain scene by crags, scars, waterfalls and gorges, so do these by providing nesting places add to the region's birds. The peregrine falcon, which must surely be as numerous in this part of Wales as anywhere in Britain, breeds on most of the really precipitous crags. The ring ouzel's favourite haunt is the heathery scree or gorge-side where its strange note, three or four times repeated, rings out so persistently across many an upland valley. Rocky ledges also attract buzzards, crows and kestrels to the mountain region; and at lower heights, cracks in rocks are the haunt of jackdaws, stock doves and barn owls. One other species, the wren, smallest of our true mountain species, can also be classed as a rock-face dweller, for it haunts the very highest places the four seasons round, except when severe weather expels it to lower ground.

Another mountain habitat with a special bird community is offered by the numerous lakes and small pools and by the peat bogs that in places lie near them. Many lakes and reservoirs, however,

are disappointing, and only the few shallow waters partly choked with vegetation are much frequented by breeding birds. A few pairs of teal, a pair or two of mallard and perhaps a small colony of black-headed gulls would be a typical population of such a lake; with sometimes a pair of moorhens, though they are rather scarce on moorland tarns and in any case extremely skulking. Common sandpipers, independent of waterside vegetation, are found round nearly all lakes where the margins are not too soft and boggy. It is otherwise with the rare dunlin which seems to be very particular about its habitat requirements, being partial to peat-hags intersected by soft black oozy channels, especially near pools or lakes. Along the streams flowing out of these lakes will be found dippers, grey wagtails and common sandpipers, right down to the coast.

The woodland, from the bird-study point of view, may be classed into three main types: conifer plantations, principally those of the Forestry Commission; deciduous hillside timber mainly of oak and birch with a few other species; and mixed woods, with large specimen trees on lowland estates. Some striking features are brought out by a comparison of the bird populations of these three woodland types.

Obviously the establishment of a plantation on a moorland will soon alter the locality's bird population. But perhaps it is not generally realised just how soon changes begin to occur. The forest

Dipper

fence itself, before any trees are planted, may be sufficient to attract whinchats to an area of tussocky purple moor grass by providing the males with the singing perches so essential to them. So may be established a small local population which in a year or two's time will be using the leading shoots of little conifers as perches, and which will eventually colonise wide areas of new forest. But after a few more years, when the trees have bushed out and smothered the grass, the winchats, along with skylarks, wheatears and pipits, will have been banished to the outskirts of the forest.

By then a number of undergrowth-loving species will have come in, not so much as residents but as summer visitors: willow and garden warblers, whitethroats, grasshopper warblers, hedge sparrows, robins, wrens, yellow hammers, all being species that can thrive in low dense cover. A few more years, adding several feet to the trees, will bring in species which like either higher singing perches or more open nesting sites, or both. They will be mostly blackbirds, song thrushes, tree pipits, goldcrests, chaffinches, bullfinches and redpolls. The colonisation of many of the high plantations by redpolls has been one of the most interesting effects of afforestation on bird life. Another, though on a smaller scale, has been the increase in ring ouzels which perch, sing and generally lead a blackbird-like existence among the conifers and even sometimes nest in them. The siskin, or aberdevine, which has begun to breed in the conifer forests of the Snowdonia Forest Park, seems likely to

Blackgame

spread into mid-Wales, if indeed it has not already done so.

As time passes the stage is reached in forest growth where the lower branches of the trees are 'brashed' or cut off. Now through what was impenetrable jungle a man can walk freely between the tree trunks. The effect on the bird life is immediate. The undergrowth-lovers come no more: instead they seek the shelter of younger plantations; and the now draughty woods with their lengthening bare trunks are left for species which like tall trees, with some space between them, and a bare forest floor. Goldcrests remain, and that typical conifer-forest species the coal tit will be encouraged by the new character of the forest. The stage is now set for the final phase where the trees are thinned and re-thinned, and the survivors grow on to maturity. In that long period there will be a gradual infiltration of ever larger species: jay, magpie, wood pigeon, carrion crow, sparrow hawk, kestrel, tawny owl, long-eared owl; then buzzard and raven; perhaps even heron, who knows? Then there is the final hope that the rare kite, so much in need of sanctuary now that some of its old deciduous nesting-woods are threatened with felling and replanting, may ultimately find a refuge in the new conifer forests.

The black grouse likes the vicinity of the upland plantations at all stages of their development, for if the cover may not suit it for nesting, the shoots of the pine trees are a perennial attraction as food; so in several forests it thrives and increases after having become quite scarce earlier this century.

In some ways the deciduous hillside woods resemble mature conifer plantations: the trees are tall and spaced and there is little undergrowth because the practice is to allow sheep to graze their floors. This means few undergrowth-warblers and other small species of similar habit, which have to seek sanctuary in neighbouring hedges, thickets and lane-sides. But in such places the beautiful wood warbler comes into its own and, with the pied flycatcher and the redstart, fills the spring woods with song. This too is the haunt of coal, blue, great and willow tits in that numerical order; and here the tree-dwelling mistle thrush may be more abundant than the bush-haunting song-thrush and blackbird. These sloping woods, with their alluring side dingles and gorges, are the strongholds of buzzard, sparrow hawk, tawny owl, raven, carrion crow and greater spotted woodpecker.

In our third main type of woodland, the richer, more parklike mixed timber of lowland estates, which usually has a well varied undergrowth, there is a greater variety of birds. Here are most of those already mentioned, with the addition of chiffchaff, blackcap, nuthatch, green woodpecker, heron, nightjar and spotted flycatcher:

species which, though not absent from the higher woods, show a marked preference for those in valley bottoms.

A considerable proportion of this part of Wales consists of rather rough farm land lying between 300 and 1,000 feet, much of it on poor ill-drained soils. A list of its birds would be a recital of mainly common species. But one might mention the numbers of curlews breeding in some marshy areas; the corncrakes which still summer here and there; the abundance of the woodlark up to about 1,000 feet in some localities; and one area of special interest to bird-watchers: Cors Tregaron Nature Reserve, which is a large bog in mid-Cardiganshire. Then there is the coast, mainly sandy in Merioneth and rocky in Cardiganshire, which forms a very beautiful western margin to the region. Scattered along the cliffs in spring are the nesting birds: herring gulls, cormorants, shags, guillemots, razorbills, fulmars, peregrine falcons, ravens, buzzards, choughs, jackdaws and stonechats: while along the shore below breed oyster catchers, ringed plovers and the occasional pair of lesser terns. Redshanks breed in quite good numbers along coastal and estuarine marshes, along with mallard, shelduck, reed buntings, whinchats, lapwings, grasshopper warblers and—though only occasionally—water rails and dunlin.

REPTILES

Of reptiles the brown lizard is plentiful from the coast to the hills, where its range extends to about 2,000 feet. The rare sand lizard has also been recorded for the Merioneth coast. The slow worm, a snake-like, legless lizard, is common in the lowlands but is probably absent from the mountain region. Of snakes, the grass snake is a rather local creature of lowland watersides while the adder, which seems to have much decreased this century, is also now very local. It is found in some of the larger peat-bogs up to 600 feet and in a variety of drier habitats such as hedgerows, gorsy heaths, scrubby woodland and rocky hillsides.

AMPHIBIANS

Frogs breed up to at least 2,500 feet, but the rather less plentiful toad seems confined to lower ground. All three British newts are found in the region, the palmate being commoner than the smooth, while the warty newt is local: but a great deal more searching and filling in of the details of distribution is desirable. For while it is known that the palmate newt is widely spread from the coast to high in the mountains, and that the smooth and warty newts are lowland species, little else seems recorded about the ecology of the three species in this part of Wales.

As for the fish, the most striking feature is the lack of variety of freshwater kinds, both large and small, in these western counties. The many species of coarse fish common in England and East Wales are local or quite absent from the rivers of these forests, and where they do exist it is often the result of introduction by man. Of the larger species, pike and perch are probably the least uncommon; of small species the minnow has the widest distribution.

The place of coarse fish is taken by the brown trout which abounds in nearly all the lakes and the scores of fast rocky streams that pour off the mountains. Where feeding is poor, trout remain finger-sized all their lives, but those in the favourable conditions they find in some lakes quickly reach several pounds. Most of these forests lie south of the char's range in Britain, but at least one of the lakes does hold this intriguing cousin of the trout.

Salmon and sea-trout ascend the rivers for breeding, their numbers varying much from year to year. Other common estuary fish include bass, dab, flounder, sand-eel, grey mullet, pollack and small weaver; and there are of course many less frequent or seasonal species such as plaice, turbot, mackerel, red and grey gurnard, garfish and the two shads. Sea-lampreys over three feet in length have been taken in the Dovey.

Large conger eels, lobsters, and crabs are common on the rocky shores.

Trout

INSECTS

BY F. C. BEST

BUTTERFLIES

Of all the insects the butterflies naturally attract most attention. Central Wales lacks many species found farther south, or found only on chalk or limestone, but one of the northern species, the Large Heath, reaches its southern limit here.

The three ubiquitous Whites and the Orange Tip are common, but the Wood White has not been recorded from this area and its occurrence anywhere in Wales is doubtful. The caterpillar of the Brimstone feeds only on alder buckthorn, a shrub that grows sparingly in the Mawddach Valley and on the fringes of Borth Bog, and there this handsome butterfly is to be found in small numbers.

The Fritillaries are well represented, and all but two of the British species are to be found. Both the Pearl-bordered species are common, and the Dark Green is abundant on the hillsides in some years. The High Brown and the Silver-washed, both woodland species, are less common but occur in the sheltered wooded valleys. Although widespread in England, the Marsh Fritillary is perhaps a more truly western insect, and is common in very restricted colonies on the edges of bogs and in damp meadows where the devil's-bit scabious grows.

The Small Tortoiseshell, Peacock, Red Admiral and Comma are present all over the area, but subject to seasonal fluctuations. The Large Tortoiseshell disappeared from most of its British localities, but in recent years has been found again in some, including parts of Wales, though it has not yet been recorded from this area. The White Admiral and Purple Emperor are absent from Wales except possibly the Monmouth borders, but there appear to have been a few authentic cases of single Purple Emperors turning up locally within Wales.

The Meadow Brown, Ringlet, Wall, Speckled Wood and Small Heath are widespread and common. The Gatekeeper is local, mainly in coastal areas, and the Grayling is found on dry heathy hillsides, usually near the coast.

The Large Heath reaches its southern recorded limit in Great Britain on Tregaron Bog. It is also to be found on Borth Bog and on

smaller mountain bogs in Merioneth and Montgomeryshire. The Welsh form is the typical *tullia*, the same as that found in Northern England and South Scotland, whilst the intervening population from Flintshire to North Lancashire is the heavily spotted variety *philoxenus*.

Neither the Scotch Argus nor the Mountain Ringlet has ever been recorded from Wales, although the grasses on which they feed, *Molinia* and *Nardus* respectively, are abundant in likely looking localities. The Marbled White is present on the Carboniferous Limestone in South Wales but appears to be absent from Central and North Wales.

The Small Copper is ubiquitous and four out of the five British Hairstreaks are found in this region. The Green Hairstreak is often abundant on hillsides where its food plants, bilberry and dwarf gorse, grow; the Purple Hairstreak swarms in some years in the scrub oak woods. The rare and elusive Brown Hairstreak is local in the Dovey Valley, where the caterpillars may sometimes be found feeding on sloe. Welsh specimens of this butterfly tend to be larger and more brightly coloured than those from England. The White Letter Hairstreak has been recorded from Merioneth and Cardiganshire, but it tends to disappear for long intervals.

The Small Blue and the Silver-studded Blue are almost entirely coastal in Wales; they have a number of localities on the North and South Wales coasts but appear to be lacking in the middle, although they may have been overlooked. Similarly the Brown Argus, whose food plant is usually rock-rose, appears to be confined to the Carboniferous Limestone rocks, which are absent from this area. The Large Blue has never been recorded but is worth looking out for. Only two Blues, the Common and the Holly, are generally to be found.

The Duke of Burgundy has been recorded from Llanbedr and Eglwysfach, but is generally rare. The Large, Small, Dingy and Grizzled Skippers are not uncommon, but the Small Skipper is at the northern limit of its range in Britain.

The Red Admiral population is occasionally augmented by vast numbers of immigrants, and in late summer they can then be found wherever heather is in flower. The Painted Lady is sometimes absent, but in good migration years it may be common.

In 1946 the Bath White immigration reached South Wales, but how far north any specimens penetrated is not known. The Monarch or Milkweed Butterfly, that great American migrant, has been recorded in the area.

The year 1947 was a great migration season for Clouded Yellows which could then be seen all over the hills, and with the usual sprinkling of the pale variety, ab. *helice*. Whether the true Pale

Clouded Yellows, *Colias hyale*, or the newly differentiated *C. calida* have been recorded, is uncertain.

MOTHS

Nearly all the British resident Hawk-moths occur. The Poplar and Elephant Hawks are common and the Eyed, Privet, Small Elephant and both Bee Hawks are resident, while the Lime Hawk may be. In some years the Humming Bird Hawk is common and the Death's Head and Convolvulus Hawks have occasionally been seen.

The Drinker, Northern Eggar, Fox Moth and Emperor are familiar insects. The Garden Tiger, Wood Tiger, Ruby Tiger, Clouded Buff and Cinnabar are frequent, while the brilliant and local Scarlet Tiger is to be met with on stream and marsh side in the Dovey Valley.

Of the Burnets, the Six-spot occurs on coastal areas and the Five-spot is probably resident. The Transparent Burnet's only known locality in England and Wales is in the Lleyn peninsula, but it is well worth looking out for on rocky coastal areas, as an unknown colony might be found. The Forester is local.

The Orange Underwing may be seen flying around birch trees in the March sunlight, and the beautiful Yellow Underwing is an attractive day-flying moth of the moors in summer.

Night-flying moths are less familiar, but a mercury vapour light trap will produce a varied selection and as many as 75 species have been taken in one night. Beside the Hawk-moths and the Noctuas, many of the Prominents can be attracted, while among the Geometers most of the Thorns have been taken. Such attractive or interesting species as the Scarce Silver Y, and most of the other Plusias, occur. The Lobster, Great Prominent and Alder are present and on one occasion *Phitometra biloba*, an American species only once previously recorded in Britain, was caught.

The Ashworth's Rustic, a species peculiar to Britain and not known outside Wales, frequents the rocky hills, and in autumn the beautiful Merveille-du-Jour may be found on oak trunks, closely resembling the lichen on which it sits. The delicate Large Emerald comes readily to light, and the handsome Clouded Magpie may be dislodged from the branches of wych elm.

OTHER INSECTS

A fair selection of dragonflies is to be found in suitable localities.

The Hornet has occasionally been seen but the Giant Wood Wasp, of similar size but more brightly coloured and lacking the wasp-waist, is not uncommon where the softwood timber in which it breeds is lying.

Among harmful forest insects, the Pine Weevil, the Pine Shoot Beetle and the Pine Looper Moth are to be found where pine has been planted, and there are now a number of saw-flies feeding on larch, spruce and pine, which have not so far caused serious damage. The Spruce Aphis is responsible for widespread defoliation of Sitka spruce in some years, and various species of the minute aphis-like Adelges are responsible for the cone-like galls on spruce, and the white woody flecks on Douglas fir and larch needles.

Occasionally the oaks are defoliated by the Green Tortrix and other small caterpillars, and there have been cases of a nearly related moth, the Bilberry Tortrix, consuming not only the bilberry but also the young trees planted among it.

The little Heather Beetle is another insect that sometimes increases to enormous numbers and kills out acres of heather.

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APPROACHES TO THE FORESTS

BY H. L. EDLIN

In this chapter are set out briefly the best lines of approach to the forests, by road and rail, with an outline of the public transport services available. As the times of such services are subject to alteration, no attempt is made to give details. Train times may be found in the current timetables of British Railways, Western Region. Nearly all the bus services are shown in the timetables of Messrs. Crosville, for their *No.* 5 *Area—North Cambrian and South Cambrian Districts;* this is available, price 9d. from their local depots, or price 1s. post free from their Office at Crane Wharf, Chester.

A long-distance bus service, operated by Associated Motorways, runs from Aberystwyth to London. It stops at Ponterwyd, Llangurig, Rhayader, and Llandrindod Wells, and proceeds via Kington, Leominster, Hereford, Ross-on-Wye, Cheltenham and Oxford. There is one bus daily each way. Timetables are obtainable from Associated Motorways, Cheltenham, or Victoria Coach Station, London.

For convenience in describing the various routes, it is assumed that the visitor starts from one or other of the several centres mentioned below, the northern forests being taken first.

THE DEUDRAETH REGION

Deudraeth Forest draws its name from the two marshlands, or *traethau*, that run inland from Tremadoc Bay. Between the two lies the village of Penrhyndeudraeth—the 'head of the ridge of the two marshes.' The western or great marsh, called *Traeth Mawr*, has largely been reclaimed from the sea to yield an expanse of pastures; this work was done about 1816, by William Maddox who built the great embankment and founded the town of Portmadoc. The eastern or lesser marsh, *Traeth Bach*, still holds an arm of the sea, and runs up to the lovely Vale of Ffestiniog. The Ffestiniog Railway was originally built to transport slates down from the great quarries of Blaenau Ffestiniog, across the estuary, to the quays of Portmadoc.

The lower portion of it is now operated in the summer months as a holiday attraction, the quaint little trains going as far as Tan y Bwlch near Maentwrog, and passing through part of Deudraeth Forest en route.

Deudraeth Forest lies on the foothills of the two marshlands, and in the absence of any central town we can but list briefly the railways and roads that serve its surroundings. The main Western Region railway line runs from Pwllheli and Criccieth through Portmadoc, and turns south at Penrhyndeudraeth to follow the coast to Harlech, Barmouth and Dolgellau, and thence through to England. A distinct branch starts at Blaenau Ffestiniog, runs through Ffestiniog and Trawsfynydd, and then crosses the moors to join the main line at Bala Junction.

The main road north-east from Portmadoc to Blaenau Ffestiniog runs through many of the Deudraeth woodlands; it carries a bus service at hourly intervals. Certain buses make connections at Maentwrog Bridge for the road to Harlech and Barmouth, which runs near other forest blocks. The third main road near the forest is that from Maentwrog south to Dolgellau; this carries a bus service running from Dolgellau to Blaenau Ffestiniog, with connections for Portmadoc at Maentwrog or Ffestiniog. Another road linking the Ffestiniogs more directly with Trawsfynydd, and carrying an occasional bus, gives access, at Pont Newydd, to the Hafod Fawr portion of Deudraeth Forest.

Trawsfynydd, by the way, is to be the site of a big new nuclear power station. Blaenau Ffestiniog, long famous for its slate quarries, is the centre of a 'pumped storage' scheme to supply hydro-electric power at times of peak consumption. Penrhyndeudraeth has a factory that makes commercial explosives. Not far away are the delightful waterside resorts of Borth y Gêst and Portmeirion, each affording fine views of the forested hills.

Down near the coast, between Talsarnau and Harlech, some of the Deudraeth woods lie on the hillside east of the main roads. Others lie on the Morfa Harlech, between the sea shore and the side road which runs from Harlech to Llanfihangel y Traethau.

DOLGELLAU

Dolgellau, once spelt Dolgelley, is an old stone market town standing in a strategic position at the original bridgehead across the Mawddach estuary. It lies in the shadow of lofty Cader Idris. Dolgellau is now the county town of Merioneth, but its quaint and narrow streets hold few notable buildings. Its name probably signifies 'the meadows beside the woods,' a description as apt today as it was centuries back.

RAILWAYS

The main line to Llangollen, Ruabon, Shrewsbury and the Midlands, runs *north-east*, passing through the Wnion valley woods of Coed y Brenin Forest on its climb up to Bala Lake. The stations of Bontnewydd, Wnion Halt, Drws y Nant, and Garneddwen may be used to reach these woodlands, and the noble hills—Rhobell Fawr and the Arans—that rise above them.

The line that runs *south-west* down the south side of the Mawddach estuary has stations at Penmaenpool, Arthog, and Barmouth Junction, giving access to portions of Coed y Brenin Forest on the south. From Penmaenpool it is also possible to cross the toll bridge to the northern bank, and so gain access to Cwm Mynach and Waterloo Wood.

From Barmouth Junction one branch turns *north* for Barmouth town and thence up the coast to Harlech, Portmadoc and Criccieth, so providing an approach to Deudraeth Forest. It should be noted that the railway bridge across the estuary is open to pedestrians, on payment of a small toll. The other branch runs *south* down the coast to Towyn, Dovey Junction, Machynlleth and Aberystwyth.

ROADS TO THE EASTERN HILLS

The main road *north-east* towards Bala, Llangollen, and the north of England runs for eight miles through the Wnion Valley sections of Coed y Brenin Forest. It carries an occasional bus service.

The road to the *south-east* climbs clear of the woods, but affords grand views as it winds up for three miles to the Cross Foxes Inn. There it forks, and the eastern branch crosses the steep Bwlch Oerddrws pass to Dinas Mawddwy, where it touches on an outlying portion of Dovey Forest. At Mallwyd, a couple of miles farther on, a route strikes east to Welshpool and Shrewsbury; while another runs south, below Dovey Forest, to Machynlleth. On certain days a bus takes this route as far as Dinas Mawddwy.

The alternative road from Cross Foxes goes southwards over the shoulder of Cader Idris to a point above Tal y Llyn, which gives a good view down that beautiful lake; one branch follows its shores south-west towards Towyn. The main road winds through a narrow gap to drop down among the close-packed cottages of Upper Corris, and then proceeds through Lower Corris and Dovey Forest to Machynlleth. A bus runs from Dolgellau to Upper Corris, where connections can be made for Machynlleth; it then goes by way of Tal y Llyn to Towyn.

ROADS DOWN THE MAWDDACH ESTUARY

There are two splendid scenic roads down the Mawddach estuary, west of Dolgellau. That on the south side runs through a succession of Coed y Brenin outliers to gain the sea at Fairbourne. It carries a bus route to Towyn.

The northern road crosses first the River Wnion and then the River Mawddach to Llanelltyd; thence it runs below the wooded hills to Bontddu and Barmouth. A bus service follows this road to Barmouth, whence another service goes north up the coast to Harlech and Portmadoc.

The two estuary roads, north and south, are linked by a toll bridge beside Penmaenpool Station.

ROADS UP THE MAWDDACH VALLEY

The finest scenic route from Dolgellau, however, is that running north through Llanelltyd up the Mawddach valley to Ganllwyd, and thence over the moors to Trawsfynydd Lake and Ffestiniog; it carries a bus service to Blaenau Ffestiniog. It runs below the steep slopes of the Precipice Walk, away on the farther bank, and past the oakwoods of the National Trust around the Ty'n y Groes Hotel, continuing through the great plantations of Coed y Brenin to the open country around Bryn Eden.

At that point a forest road winds west over the fields to the isolated Cwrt block of Coed y Brenin, whence a walker's path crosses the Bwlch Drws Ardudwy, between Rhinog Fawr and Rhinog Fach, towards the coast at Llanbedr; the distance across country from one high road to the next is ten miles; an alternative path north of the Rhinog Fawr follows the Roman Steps to Cwm Bychan and Llanbedr.

By-roads to the east of the Dolgellau-Trawsfynydd high road include some public roads open to cars, and many forest roads open only to pedestrians. All wind up wooded valleys beside torrents and waterfalls, and some pass beside the ruins of old gold mines. By crossing the river below the Ty'n y Groes hotel, it is possible to strike up the long, narrow vale leading to Capel Hermon and the farmsteads of Hafod Owen, beyond which again lies an incredibly remote school—five miles from the high road; this route continues as a public, but gated, road round to Trawsfynydd.

Alternatively, one may cross the main valley at Pont ar Eden, one mile north of the hotel, and explore the tortuous valley of the Mawddach for two miles upstream to see the fine falls called Pystyll Cain and Rhaidr Mawddach, with the gold workings nearby. Cars may be left near the prominent metal Bailey bridge or alternatively at a small car park some ¾ mile up the by-road on the

western bank; walkers may proceed up either side of the river, following the private roads.

A fine route for walkers leaves the high road at Pont ar Eden and strikes almost due north, parallel with the high road but avoiding its traffic, to Trawsfynydd. It begins as a forest road, and follows the line of Sarn Helen, an ancient Roman causeway running to the fort of Tomen y Mur, near Ffestiniog.

The outlying village of Llanfachreth, named after its church of St. Machraith, stands amid these uplands, north-east of Dolgellau, and may be reached by one of several by-roads and footpaths. The most direct route diverges north from the Bala road, half a mile out of Dolgellau, and passes close to the famous old estate of Nannau. This route also gives access to the Precipice Walk, which lies beyond Llyn Cynwch, to the west of Nannau House. A bus runs to Llanfachreth on certain weekdays.

OTHER SCENIC ROADS

A fine scenic by-road runs up the south face of the Wnion valley. From Dolgellau take the Dinas Mawddwy road for 2½ miles, then fork left for Brithdir, passing the top entrance to the famous Torrent Walk. From Brithdir, a secondary road may be followed down to the high road at Wnion Halt.

South-west of Dolgellau another by-road diverges, at the edge of the town, from the main road towards Fairbourne. It runs up to Llyn Gwernan and the inn at the foot of the famous Fox's Path Climb to the summit of Cader Idris. Follow the road ahead, through several gates, and after enjoying superb views you will reach two remote lakes and eventually descend by sharp bends down a steep hill through the woods to Arthog, beside the high road from Dolgellau to Fairbourne.

Two miles west of Llanelltyd, and directly opposite the toll road to Penmaenpool, a by-road climbs steeply up to rugged and picturesque Cwm Mynach—the valley of the monks. Though it is not a through route for motors, the rambler will find in it a good approach to the Rhinogs, whence he can turn west for Llanbedr, via the Bwlch Drws Ardudwy or the Roman Steps. Another path strikes east, where the road ends, for Ganllwyd in the Mawddach valley.

BARMOUTH

The Welsh name of this attractive town is Abermaw, from its position at the mouth of the Mawddach estuary. It developed as a fishing centre and seaport, and the old town was built in a fashion unique in Wales, as a series of stone-walled, slate-roofed houses set on ledges along the cliff face, and accessible only by long flights of

steps and narrow passages. As the old seaborne trade declined the railway arrived, the great viaduct was built across the estuary, the modern town took shape at the cliff foot, and finally the splendid sandy beach was developed.

Barmouth is a good centre from which to explore the Cambrian Forests. The approach routes are similar to those around Dolgellau, which lies nine miles away, up the estuary.

CADER IDRIS

Cader Idris, 2,927 feet, which rises to the south-west of Dolgellau, is a grand mountain, famous for its commanding position in the landscape, its miles of crag and precipice, and its hidden lakes. The grandest of these is Llyn Cau, the Cauldron Lake, which occupies a crag-fringed hollow, 1,500 feet up on the southern face. While there is nothing exceptionally difficult about the various routes to its summit, Cader can be a very dangerous mountain when the mists descend, and visitors are advised to choose clear weather, carry a compass, and to equip themselves with the one-inch Ordnance map (Dolgelley, Sheet 116). The ascent is usually made from Ty'n y Ceunant, a point three miles along a by-road running south-west into the hills above Dolgellau, and 500 feet up. The easier of the two routes from this point runs slightly west of south for just over a mile to strike the summit ridge at a height of 1,838 feet; it then turns south-east for the actual summit. The steeper route, called the Fox's Path, starts off south-eastwards, bends south-west after a mile to leave Llyn y Gafr on one's left, then resumes its south-easterly course to leave the next lake, Llyn y Gader, on one's right; a steep climb runs up to the summit ridge, and on gaining that a right turn is made for the actual summit, a quarter of a mile to the south-west.

An excellent view of Llyn Cau is obtained by dropping down east of the summit, as though to take the Fox's Path, and then diverging to the right until the great walls of crag, hemming in the deep blue pool, come into view below. There is also a grand ridge walk east over the saddle to Cader's lesser summit, Mynydd Moel, 2,804 feet, which gives magnificent views over all the surrounding hills, vales and forests. By continuing north-east one can drop down the rocky ridge of Gau Graig to the upland pastures south of Dolgellau, avoiding the sheer crags that lie between that ridge and the main Dolgellau-Machynlleth road.

The best route up from the south starts at a point $\frac{1}{4}$ mile from the junction of the Tal y Llyn road with the main Dolgellau-Machynlleth road. Here you leave the Tal y Llyn road through two iron gates, and follow first a track and then a path up to the shores of Llyn Cau. By bearing left, you next gain the crest of the crescent-

shaped ring of crags that hem in the lake. This ridge is then followed round in a clockwise direction (bearing right) all the way to the summit. The return may be made by continuing the circular route east until the crags are cleared and it becomes possible to drop down the steep slopes back to the lake.

MACHYNLLETH

The little grey stone town of Machynlleth stands at the bridgehead of the River Dovey, and owes its long history to its importance as the meeting place of routes linking one part of Wales with another. It was here, that in 1404, Owain Glyn Dŵr held his parliament, and a few buildings still preserve relics of those medieval splendours. Later, prosperity came from the great slate quarries around Corris, and the lead mines of Dylife, whose output was shipped from Aberdovey; but today Machynlleth is simply a centre for the farmers and foresters of the surrounding hills, or for visitors, with a depot for the railways.

Aberdovey, away down the estuary, was once a substantial port for trading and fishing vessels, but is now more concerned with the recreation provided by its hills, its beaches, and the sailing on its sheltered waters; it has a picturesque situation on the tide's edge.

RAILWAYS

The main line to Shrewsbury and the Midlands runs *north-east*, passing through outlying portions of Dovey Forest around Commins Coch station. Little of the main area of Dovey Forest is in view from the line, but Cemmaes Road station lies within two miles of it. Branch lines shown on old maps as running to Dinas Mawddwy and Corris are no longer operative. The main line to Aberystywyth runs *south-west*, and stations at Dovey Junction and Glandyfi give access to the beautiful Lyfnant Valley, to the Artist's Valley, and also to Taliesin Forest. From Dovey Junction a branch line goes *north* to Aberdovey, Towyn, and Dolgellau.

At Towyn the quaint little narrow-gauge Tal y Llyn Railway, operated only in summer, runs towards Tal y Llyn, touching on part of Dovey Forest around Abergynolwyn.

ROADS UP THE DOVEY VALLEY

A main road runs east towards Newtown, Welshpool, and England, and carries a bus service to Newtown. Between Cemmaes Road and Llanbrynmair this road runs through several portions of the Dovey Forest, on the hill around Commins Coch village.

A wonderful impression of the local scenery may be gained by turning south at Llanbrynmair, and taking the road signposted

'Staylittle' up the beautiful Twymyn valley, studded with quiet farms and woodlands. Just short of Staylittle, turn right up the road signposted 'Dylife' to see, on the right, the deep Pennant Gorge and crags of the Twymyn river. This route continues as a well-surfaced mountain road over the hills on a more direct line back to Machynlleth, giving wonderful views throughout.

At Cemmaes Road, a railway station six miles east of Machynlleth, the road for Welshpool leaves the main Newtown road, and runs *north* up the main Dovey valley to Mallwyd. On its way, it passes close to the hamlet of Aberangell, where a forest road strikes *west* across the hills towards Corris; a large portion of the Dovey Forest lies on the hills behind Aberangell; it is known as the Dovey Valley beat, but little of it can be seen from the high road.

At Mallwyd, a right fork leads *east* for Welshpool, and a left fork takes one to Dinas Mawddwy, where a substantial block of Dovey Forest stands plainly in view up a steep slope on the left.

From Dinas Mawddy, an exciting mountain road strikes north-east into the hills for Llanymawddwy, where there are some small forest areas. This leads to Llanuwchllyn and Bala; its high pass, 1,600 feet above sea level, is known as the Bwlch y Groes.

But the main road beyond Dinas Mawddwy turns *west* for Cross Foxes Inn and Dolgellau, providing an attractive round trip back to Machynlleth.

THE CORRIS VALLEY

The direct route from Machynlleth to Dolgellau runs due *north* by way of Corris village and the Tal y Llyn Pass. There is a bus service as far as Corris, where connections may be made for Dolgellau. This road passes through the heart of the oldest and most impressive portion of Dovey Forest, the Corris beat, and gives the best views of forested hillsides. It passes close to the forest office at Esgairgeiliog. There is one by-road, leading to Aberllefenni, this runs through young plantations, carries a bus service, and ends amid slate quarries.

DOWN THE DOVEY ESTUARY

The main road *west* from Machynlleth, on the *north* side of the Dovey estuary, gives wonderful views of crag, woodland, water, and sandhills on its way to Aberdovey and Towyn. It carries a bus route, and passes beside several privately owned plantations and a few outlying portions of Dovey Forest.

From Towyn, the coast road continues *north* for Dolgellau, but a more scenic route is that which goes *north-east* via Tal y Llyn. It follows the line of the Tal y Llyn miniature railway, and just

beyond the terminus of that line runs past a forest nursery covering six acres, where one may see young seedling trees being grown to the stage where they will be big enough for planting in the forests. The Abergynolwyn block of Dovey Forest, rich in spruce and Japanese larch, now comes down on either hand, and the route continues beyond the little village of Abergynolwyn. Three miles farther on, the road skirts the shores of the placid lake called Tal y Llyn, which mirrors the rocky heights of Cader Idris, towering above it to a height of nearly 3,000 feet. Beyond the lake this road joins the direct one from Machynlleth to Dolgellau; one may turn right for Machynlleth, or go left over the rugged Tal y Llyn Pass for Cross Foxes and Dolgellau.

The main road *south-west* from Machynlleth to Aberystwyth is mentioned below under that latter town; it carries a bus route.

TWO WALKS TO THE HIGH HILLS

Both these routes run *south* from Machynlleth into the forest-clad hills. Each carries a road, but owing to its steepness and the lack of turning or parking places each is unsuitable for cars. The scenery along either is among the grandest and most awe-spiring in all Wales.

The *Uwch y Garreg* by-road diverges from the Staylittle road on the right-hand side, 1½ miles out of Machynlleth, and passes between small woods and pastoral farms for three more miles before dropping into the remote gorge of the Afon Hengwm. This it follows for a further two miles, running through the sprucewoods of the Bryncynfil beat of Dovey Forest, and eventually it climbs a long slope giving superb views across to the mile-long range of sheer crags called the Creigiau Bwlch Hyddgen. Waterfalls cascade down these upper slopes of actively eroding scree, and one gets an impression of active geological forces busy re-moulding the surface of the land. At length the road runs out on to the great open plateau of sheep walks that runs *south* for five miles to Plynlimon Pass. Until a few years ago three farms far out in this remote wilderness were still occupied, but now all is deserted.

The *Llyfnant Valley* road strikes east from the main road towards Aberystwyth, four miles *south-west* of Machynlleth. It starts at a point about one mile, by footpath, from Dovey Junction Station, and follows the Montgomery-Cardigan boundary. For three miles the road provides an incomparable panorama of woodland, hill, rock, torrent, and farmstead. Some of its woods of larch, pine, and spruce form part of the Commission's forests of Dovey (in Montgomery) and Taliesin (in Cardigan); others form part of the Garthgwynion estate or belong to other private owners. The road ends

near a large private house called Plas Cwm Rhaidr, and from it one can look far up the head of the vale to the terrific fall called the Pystyll y Llyn. This cascade, though not sheer, involves a fall of some 500 feet from the rock-ringed edge of the high plateau, down into the narrow glen; when it is in spate its roaring may be clearly heard at the roadside, though it is 1½ miles away. A footpath—signposted—continues up the floor of the valley all the way to the foot of the fall. Above the waterfall lies Rhos y Llyn, and a chain of lakes known as the Angler's Retreat.

ABERYSTWYTH

The town of Aberystwyth has a long history as a seaport, thanks to its sheltered harbour where the Rivers Rheidol and Ystwyth join the sea; many fine oaks were felled in its hinterland for the shipyards that flourished here right down to the mid-nineteenth century. The value of its seaborne traffic led King Edward I, in 1277, to begin the building of the castle that now stands as a picturesque ruin on the headland beside the harbour; the town that it guarded was fortified by a stout wall, with gates at intervals. Later, the mines for silver, lead, zinc, copper and other minerals in the hills around, increased the town's prosperity. But today those traffics are ended, and the town thrives partly through its position as the cultural and commercial centre of Cardigan, partly by its attractions for the seaside holidaymaker, but largely as an educational centre. The University College of Wales, founded by enthusiasts in 1867, has spread far beyond its picturesque neo-Gothic headquarters on the sea front, and now occupies numerous buildings throughout the town. Its value as a seat of learning has been enhanced by the coming of the magnificent National Library of Wales, which is housed in a fine modern building on a hilltop, and is entitled to receive a copy of every book published in Great Britain; amongst its many treasures are medieval manuscripts of the Welsh historians and poets.

All bus services from Aberystwyth start at the railway station.

RAIL ROUTES

Two main line railways run from Aberystwyth. That going north for Machynlleth, Shrewsbury, the Midlands, and London (Paddington), passes through outlying portions of Rheidol Forest, around Bow Street Station; thereafter the line follows the shore, but where it again nears the hills at Glandyfi and Dovey Junction stations, it provides an approach to Taliesin Forest. The southward line to Carmarthen, Cardiff, and also London (Paddington) by an alternative route, runs almost continuously for six miles through the

plantations of Ystwyth Forest, around the stations of Llanrhystyd Road, Llanilar, Trawscoed, and Ystrad Meurig.

During the summer months, normally June to September inclusive, a fascinating little narrow gauge railway runs from Aberystwyth to Devil's Bridge; it goes up the steep and picturesque gorge of the River Rheidol, which is lined on either side by the plantations of Rheidol Forest.

ROAD ROUTES

The road *north* to Machynlleth (A.487) passes through outlying plantations of Rheidol Forest, around Bow Street, and of Taliesin Forest around Talybont and Tre'rddol; it carries a bus service.

There are two main roads running *east* towards Llangurig, Llanidloes, and the Midlands, one being on either side of the River Rheidol. They unite near Ponterwyd, and so can be used to provide a pleasant round; both pass close to the woods of Rheidol Forest. The northern and more direct route (A.44) carries a bus service to Ponterwyd, which then goes south to Devil's Bridge on the southern road. On certain days of the week a bus runs direct to Devil's Bridge by the southern road, continuing on occasion to Cwmystwyth, near Myherin Forest. Beyond Ponterwyd the main road east (A.44) winds through Tarenig Forest to Llanidloes; but no bus runs this way.

Two roads go *south-east* from Aberystwyth, one heading for Ystrad Meurig and the grand old ruin of Strata Florida, the other more directly for Tregaron, Lampeter and Carmarthen. Both pass for several miles through the woods of Ystwyth Forest. The more northerly of the two roads has a bus service on certain days of the week to Pontrhydfendigaid; the southern road (A.485) has a daily bus service to Lampeter.

The main coast road *south-west* from Aberystwyth (A.487), to Aberaeron, New Quay, and Cardigan, passes through the scattered blocks that comprise the young Aeron Forest; it carries a bus route to Cardigan.

A secondary road that gives magnificent views of the new woods lining the steep slopes of the Ystwyth gorge diverges from the main Aberystwyth-Ystrad Meurig road two miles beyond Crosswood Park. It runs up the south bank to Pont Rhyd y Groes, then follows the north side to Hafod Church. Thence one may proceed, by keeping left, past the landmark of the Arch (erected to commemorate the coronation of George IV in 1820) to the Devil's Bridge, and so back to Aberystwyth. By following the river eastwards, it is possible to cross the hills, by a good though gated mountain road, all the way to Rhayader.

LLANIDLOES

Llanidloes is a small but thriving market town set beside the Severn on the foothills of Plynlimon. Among its few notable buildings is the half-timbered market hall, recently restored and now used as a museum. The church, hidden away down Church Lane on the north side of Long Bridge Street, is of exceptional interest to antiquarians. Its square tower, which dates from the fourteenth century, has a squat wooden belfry and a curious pyramidal roof. The nave has a remarkable arcade down the north side, which was brought here from Abbey Cwmhir, when the church was enlarged in 1542. The nave roof was also transferred at that time, and a series of carved wooden angels added to its hammer beam ends. But even more noteworthy are the carved oak figures on the spandrels or roof-timber terminals, which are of a much earlier and medieval date, and resemble gargoyles.

Llanidloes is served by the railway line that diverges from the main Newtown-Machynlleth line at Moat Lane Junction, to run *south* to Rhayader and Builth Wells. There is a bus service (Crosville) to Newtown, but no regular daily buses run farther *west* into the hills.

From Llanidloes the main road to Aberystwyth runs *west* to Llangurig; the plantations of Tarenig Forest come into view just beyond that village, and continue right over the Plynlimon Pass. Thereafter, beyond Ponterwyd, the road runs through much of Rheidol Forest.

To the *north* of Llanidloes a secondary road winds over the steep hills around Van to Staylittle, affording on the way some grand views of Hafren Forest and Plynlimon towering above it to the *west*. Beyond Staylittle the major route continues down the beautiful pastoral Twymyn valley to Llanbrynmair, and so on to Machynlleth. A mile beyond Staylittle, a branch road signposted 'Dylife' takes a shorter, steeper, but more scenic road over the northern shoulder of Plynlimon direct to Machynlleth; its surface is now better than its white shade on the maps suggests, and any modern car can tackle it. Beyond Dylife, once a busy tin-mining village, but now a quiet farming hamlet, it gives a wonderful view over the Dovey valley and Dovey Forest towards Cader Idris and Snowdonia.

THE SEVERN GORGE

The motorist with time to spare, the pedestrian, and above all the cyclist who wishes to avoid steep hills, may reach Staylittle by an alternative, unsignposted public road, through Hafren Forest, provided he does not mind opening and closing an occasional gate. From the Market Hall in Llanidloes, go down Short Bridge Street, cross the Bridge, and turn left. Ignore a left fork half a mile farther

The view south down the Mawddach Valley, from the Precipice Walk, near Dolgellau, towards Cader Idris

The Dovey Forest centre at Esgairgeiliog, in the Corris Valley, near Machynlleth

The upper course of the Severn in the heart of Hafren Forest; the source lies high on the shoulder of Plynlimon

The Severn Gorge and a cluster of forest cottages at Hafren Forest, near Llanidloes

Hauling poles from a thinning in the sprucewoods

Loading spruce poles for road transport

The bridge across the River Tarenig, in Tarenig Forest

Looking across the course of the Wye, from the main Llangurig—Aberystwyth road, beside Tarenig Forest

on, continuing round to the right to follow the course of the infant River Severn, keeping on the right-hand side of the stream. Some 2½ miles further on, the road forks again; again keep right, and to the right-hand side of the river. Soon you will enter the spruce-woods of Hafren Forest, and pass through the picturesque gorge below the Pen y Garreg rocks. Beyond the farmstead of Rhyd y Benwch the route crosses a low divide into the valley of the Clywedog, and continues through woods and fields to Staylittle; the distance, some eight miles, is little more than that by the more hilly major road.

TO THE SEVERN SOURCE

If you wish to follow the Severn right to its source, take the road described just above to a point some 600 yards beyond Rhyd y Benwch farm, where a brick-walled hut will be seen. If you have come by car, it must be left at this point, as the forest roads and paths beyond are open only to pedestrians. Here turn left along a forest road, ignore the first right fork, and then continue on for some 1½ miles, bearing slightly right up the narrowing valley of the Severn, which lies on one's left hand. The road then forks again, the left-hand branch running down to the deserted farmstead called Blaen Hafren—the hillslopes of the Severn—where there is a bridge and an attractive waterfall; the right branch makes more directly for the open hillside. By either course it is easy to follow the little stream—generally accounted Britain's longest watercourse, right up to its source in a peat bog, 2,000 feet above the sea on the slopes of Plynlimon.

A WALK TO THE SUMMIT OF PLYNLIMON, SOURCE OF WYE, RHEIDOL, AND SEVERN

Plynlimon is perhaps the easiest to ascend of all Britain's notable summits. The path starts near Tarenig Forest at the top of the Plynlimon Pass, on the main road from Aberystwyth to Llangurig, beside the hamlet of Eisteddfa Gurig (where ponies may be hired by equestrian enthusiasts). The route strikes *north* through a farm-yard, then follows a road which bends left, and then right again over a ford; it leads on up a valley to the extensive ruins of an old lead mine. Just before reaching this, strike off towards the left, and follow a line of posts (erected by the Ponterwyd Improvement Association) which leads straight for the nearest and highest summit, Plynlimon Fawr, 2,468 feet.

A magnificent view can now be obtained over the great sea of rolling hills that builds up mid-Wales. Away to the north rises the long precipitous spine of Cader Idris, while to the *north-east* the most prominent peak is the shapely cone of Aran Fawddwy, an outlier

of the Berwyns. Between the two, on a clear day, the main ranges of Snowdonia, and perhaps Snowdon itself, may be descried. The waters of Cardigan Bay are clearly in view to the *west*, though the coastline itself is hidden by the intervening hills. Part of Dovey Forest can be seen in a valley to the *north*, while to the *south* the plantations of Tarenig Forest are in view. For the rest there is a sweep of upland pastures, with hardly a house or road to be seen.

Just below the summit to the *north* lies the damned-up lake called Llygad Rheidol—the 'Eye of the River Rheidol'; this is often accepted as the source of that river, although other tributaries farther north are longer. To find the source of the Wye, drop down on to the saddle *north-east* of the summit, until you strike a wire fence; the actual spring lies deep in a steep hollow to the *south-east* of this.

To reach the source of the Severn, follow the fence line *north-east* for about half a mile, then strike up the slope for Plynlimon's second summit, called Arwystli, 2,427 feet. Continuing *north-east* down a gently sloping ridge, you will see a small stream meandering down eastwards from a peaty bog; there lies the source of the mighty Severn, though it is not easy to say which little pool lies highest.

From this point there is a fine view of the Severn Gorge in Hafren Forest, and the plantations may be seen extending up several valleys and also over the distant hills. The rocky summit just east of the Severn source, which is 2,008 feet high, is Plynlimon Cwm Biga. It is prominent in local landscapes, and is often mistaken for the true summit.

The ascent of Plynlimon Fawr from the road takes 1½ hours. Five hours should be allowed for the walk from the high road to the source of the Severn and back.

POINTS FOR GEOGRAPHERS

Every schoolboy knows that the Severn is Britain's longest river, its length from source to mouth being generally quoted as 220 miles. However, that figure is obtained by measuring the main course upstream from Llanidloes. As an alternative, one can measure its tributary, the Clywedog, which comes in at Llanidloes, and this will be found to be three miles *longer*. Its source is some five miles *north* of that of the Severn, on Bryn Fedwen, and just below the mountain road from Llanidloes via Staylittle and Dylife to Machynlleth. Thus, in reality, Britain's longest river is the Severn-Clywedog, totalling 223 miles.

In the same way, the accepted upper course of the Wye (130 miles long) is not that of its longest element. Its tributary the Tarenig, which gives its name to Tarenig Forest and which joins the Wye at Pont Rhyd Galed, is one mile longer than the main stream. Both rise on Plynlimon.

MISCELLANEOUS INFORMATION

HOTELS

The Cambrian Forest region includes several seaside resorts with so many hotels that it is impossible to list them all here. Information may be sought from the usual town guides. Only a few of the principal hotels at each forest centre are noted below:

Portmadoc, Royal Sportsman
Blaenau Ffestiniog, North Western
Ffestiniog, Penywern Arms, Abbey Arms
Harlech, St. David's, Queen's
Barmouth, Cors y Gedol, Royal
Dolgellau, Golden Lion Royal and Ship, in the town. Ty'n y Groes, Caerwynch Hall, Dolmelynllyn Hall, Bontddu Hall, and Lake Gwernan, in the vicinity
Towyn, Corbett Arms
Aberdovey, Trefeddian, Penhelig Arms
Machynlleth, White Lion, Wynnstay
Mallwyd, Brigands Inn
Aberystwyth, Belle Vue Royal, Commercial, Talbot, Castle, Marine
Devil's Bridge, Hafod Arms
Ponterwyd, George Borrow
Llangurig, Black Lion
Llanidloes, Lion, Unicorn
Aberaeron, Feathers Royal
Talybont, The White Lion

YOUTH HOSTELS

The following Youth Hostels are conveniently placed for visits to the forests named:

Harlech for Deudraeth Forest
Ffestiniog (Caerblaidd Hostel) for Deudraeth Forest
Pont ar Eden Hostel, near the Gold Mines in the heart of Coed y Brenin. *Note*. To reach this hostel, go east from the Dolgellau—Trawsfynydd road at Pont ar Eden, following the forest road as far as the Bailey bridge. There, without crossing the river, turn left, and follow the side road for nearly a mile up the stream.

Borth for Taliesin, Dovey and Rheidol Forests
Dolgellau (Kings Hostel) in the Gwynant Valley for Coed y Brenin
Note. To reach this hostel, follow the Dolgellau—Fairbourne road for four miles to Abergwynant. Then turn left and go up a by-road for nearly a mile.
Blaencaron for Aeron Forest
Nant y Dernol for Tarenig Forest

MAPS

In the Ordnance Survey one-inch series, the following sheets show the forests mentioned:

No. 116 *Dolgelley.* Deudraeth, Coed y Brenin, and northern portions of Dovey Forest.
No. 127 *Aberystwyth.* Southern portions of Dovey Forest, Taliesin, Rheidol, Myherin, Ystwyth, Tarenig, western portions of Hafren, northern portions of Aeron.
No. 128 *Montgomery and Llandrindod Wells.* Eastern portions of Hafren.
No. 139 *Cardigan.* South-western portions of Aeron.
No. 140 *Lampeter.* South-eastern portions of Aeron.

In Messrs. Bartholomew's *Half-Inch* series, all the forests *except* Myherin, Ystwyth, and Aeron appear on the *Mid-Wales* sheet, No. 22. The three forests named appear on the *Cardigan* sheet, No. 17.

In the Ordnance Survey *Quarter-Inch* series, all the forests *except* Aeron appear on sheet 4, *North Wales.* Aeron Forest, and also Taliesin, Rheidol, Myherin, Ystwyth, Tarenig, and Hafren Forests, are shown on Sheet 7, *South Wales.*

AN ANCIENT DENIZEN OF THE CAMBRIAN FORESTS

From the *Itinerary of Giraldus Cambrensis,* circa 1188, as translated by Sir Richard Colt Hoare, 1806.

'The Teivi has another singular particularity, being the only river in Wales, or even in England, which has beavers; in Scotland they are said to be found in one river, but are very scarce. I think it not a useless labour, to insert a few remarks respecting the nature of these animals; the manner in which they bring their materials from the woods to the water, and with what skill they connect them in the construction of their dwellings in the midst of rivers; their means of defence on the eastern and western sides against hunters; and also concerning their fish-like tails.

The beavers, in order to construct their castles in the middle of rivers, make use of the animals of their own species instead of carts, who, by a wonderful mode of carriage, convey the timber from the woods to the rivers. Some of them, obeying the dictates of nature,

receive on their bellies the logs of wood cut off by their associates, which they hold tight with their feet, and thus with transverse pieces placed in their mouths, are drawn along backwards with their cargo, by other beavers, who fasten themselves with their teeth to the raft. The moles use a similar artifice in clearing out the dirt from the cavities they form by scraping. In some deep and still corner of the river, the beavers use such skill in the construction of their habitations, that not a drop of water can penetrate, or the force of storms shake them; nor do they fear any violence but that of mankind, nor even that, unless well armed. They entwine the branches of willows with other wood, and different kinds of leaves, to the usual height of the water, and having made within-side a communication from floor to floor, they elevate a kind of stage, or scaffold, from which they may observe and watch the rising waters. In the course of time, their habitations bear the appearance of a grove of willow trees, rude and natural without, but artfully constructed within. The animal can remain in or under water at its pleasure, like the frog or seal, who shew, by the smoothness or roughness of their skins, the flux and reflux of the sea. These three animals, therefore, live indifferently under the water, or in the air, and have short legs, broad bodies, stubbed tails, and resemble the mole in their corporal shape. It is worthy of remark, that the beaver has but four teeth, two above and two below, which being broad and sharp, cut like a carpenter's axe, and as such he uses them . . . '

PRONOUNCING WELSH NAMES

As a guide to pronunciation, it is helpful to remember the following points in which Welsh differs from English usage:

- c always hard like *k*
- ch guttural, as in Scots *loch*
- dd as *th* in English *the*
- f as English *v*
- ff as English *f*
- g always hard
- ll aspirated, as *hl*
- u the nearest English equivalent is the *ee* of *deep*
- w when used as a vowel, has the sound of *oo* in *fool*
- y (*a*) in words of *one* syllable, as *i* in *did* or exceptionally *ee* in *deep*
  (*b*) in *final* syllables as *i* in *did*
  (*c*) in other syllables as *u* in *funny*

The dipthong 'eu' has the sound of *ei* in *height*.
The dipthong 'au' has the sound of *au* in *draught*.

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